JANUARY 1960

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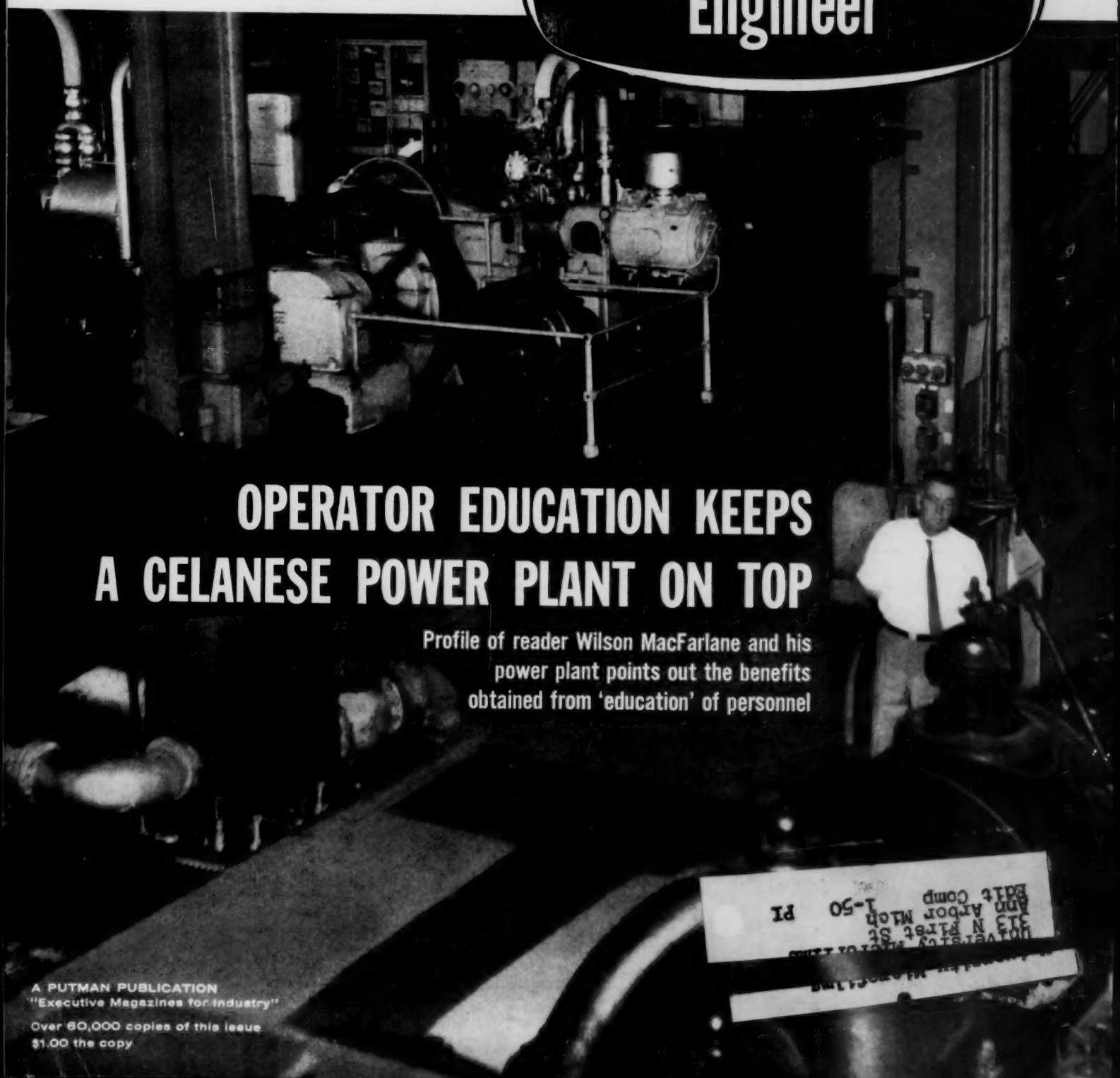
PLUS over 90 reports on technical developments, new solutions and new literature for effective plant and power services

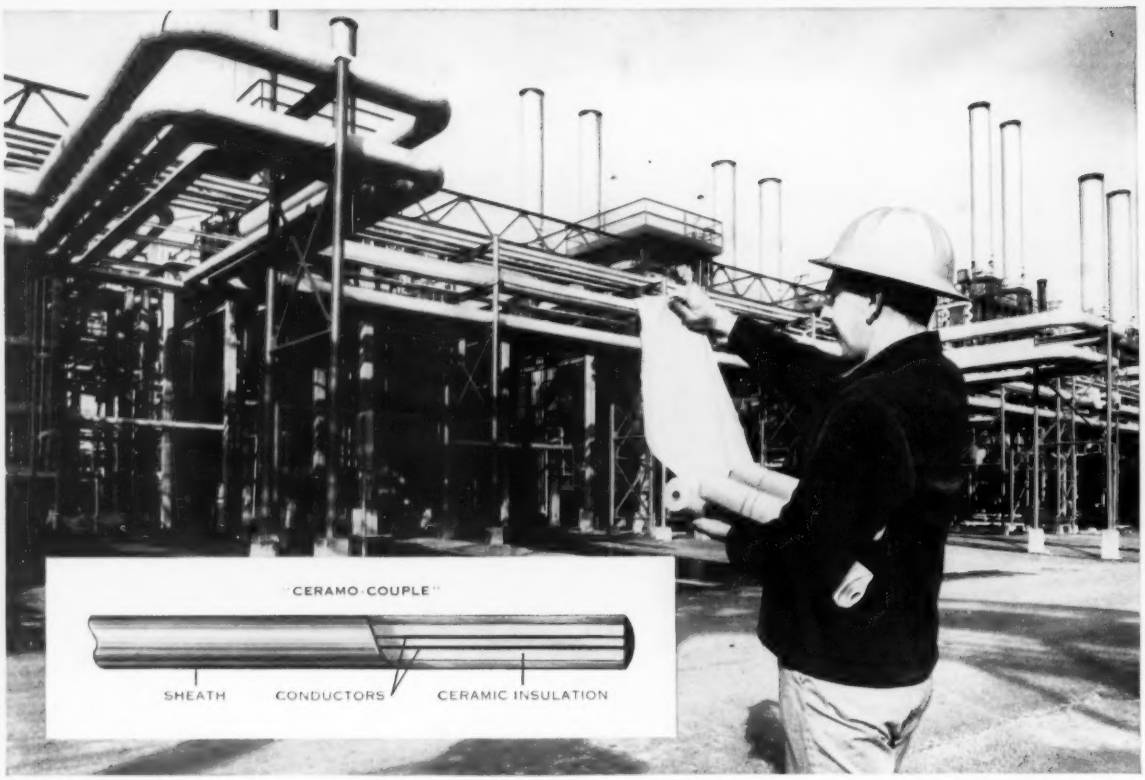
Plant and Power Services Engineer



OPERATOR EDUCATION KEEPS A CELANESE POWER PLANT ON TOP

Profile of reader Wilson MacFarlane and his power plant points out the benefits obtained from 'education' of personnel

A PUTMAN PUBLICATION
"Executive Magazines for Industry"
Over 60,000 copies of this issue
$1.00 the copy



Process engineer at Sun Oil Refinery examining temperature measurements from "Ceramo" thermocouples.

Ceramo® Thermocouples Help Sun Oil Prevent Furnace Tube Failure

Thermo Electric's Versatile "Ceramo" Solves Another Problem

The Sun Oil Company refinery at Marcus Hook, Pa., found the answer to a difficult problem—preventing tube failure in their process heaters—with T-E's "Ceramo-Couples."

As coking and scaling build up within these tubes, heat transfer is reduced and tube temperatures rise. Unchecked, this condition can eventually result in costly, unscheduled shutdowns and potentially dangerous tube rupture.

Sun Oil also had another problem—rapid thermocouple failure. To measure tube skin temperatures from 500—1200° F. and withstand furnace temperatures to 1800° F., they were using 8-gage, insulated, pencil-type T/C's without protection tubes. Wires became brittle and soon broke. Hot junctions separated from the tube wall and read gas instead of tube temperatures. Process engineers had no confidence in readings. Costly, time-consuming installation of new T/C's was needed after every furnace shut-down.

Sun Oil went looking for a better thermocouple. They found it in T-E's "Ceramo"—ceramic insulated conductors encased in overall metal sheathing. Their 3/16" O. D. "Ceramo-Couples" have 20-gage Chromel-Alumel conductors and stainless steel sheathing. Thermocouple life was greatly increased, replacement was cut in half. Reliable readings from "Ceramo" permitted operation of process heaters at higher temperatures—thereby increasing production. "Ceramo's" ability to be bent on a small radius without shorting or grounding simplified installation. And "Ceramo" flexed with the differential motion between tubes and furnace walls.

Sun Oil now has about 300 "Ceramo-Couples" in use at Marcus Hook in 5 to 32 ft. lengths. During the 5 years "Ceramo" has been in use, Sun Oil has had no furnace tube failure or unscheduled shut-downs from faulty temperature measurement.

If you have problems of high temperature, moisture, abrasion, corrosion or difficult installation, investigate T-E's "Ceramo." Only "Ceramo" has the quality of materials and construction to meet all these needs.

Write For EDS-45—20

Thermo Electric CO., INC.
SADDLE BROOK, NEW JERSEY
In Canada: THERMO ELECTRIC (Canada) LTD., Brampton, Ontario

Circle 9000 inside back cover.

THAT'S INTERESTING

Cuts grease cleaning to half the time

Ultrasonic cleaning cuts cleaning time of aircraft oil filters by fifty percent or more. What previously required 20 minutes of hand scrubbing can now be accomplished in less than 10 minutes with sonic energy.

Although designed specifically to accommodate oil filters, the units may be used for a wide variety of other industrial and commercial cleaning applications.

Designed by Gulton Industries, Inc., Metuchen, N. J., the ultrasonic cleaners are being used on filter components of the prop-jet engines on the Lockheed Electra.

Electronic "ear" locates miners

A new underground listening aid known as an electronic "ear" may help locate trapped miners in disasters.

The device consisting of a microphone and sensitive amplifier enables faint sounds to be picked up and amplified many times before being passed to a pair of headphones.

Signals can be heard at a range of 700 yards in a quiet mine and 440 yards in one where machinery is working and creating background noise.

The device is manufactured by The General Electric Co. of England, Kingsway, London W.C.

He writes book he never saw

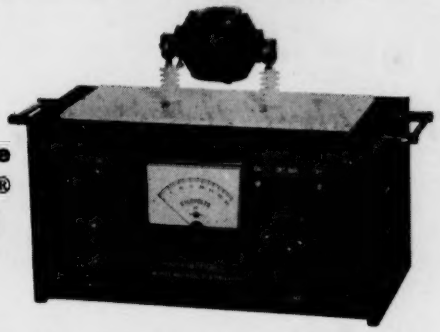
He wrote the book — but he had never seen it before.

This was the surprise the mail brought Igor Karassik, a consulting engineer for

To inside back cover

NEW . . Insulating Oils Tester

On-the-Spot Dielectric Strength Measurements



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4-35.3

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CONVENTIONS and EXHIBITS

Jan. 25-28: Plant Maintenance & Engineering Show; Convention Hall, Philadelphia, Pa.

Feb. 1-4: Industrial Electric Heating Conference; Netherland-Hilton Hotel, Cincinnati, Ohio.

Feb. 1-4: American Society of Heating and Air Conditioning Engineers, Dallas, Texas.

Feb. 3-4: Midwest Welding Conference; Illinois Tech Chemistry Bldg., Chicago, Ill.

Feb. 5-6: Industrial Management Engineering Conference; Illinois Institute of Technology, Chicago, Ill.

Mar. 6-9: National Electrical Industries Show; New York Coliseum, New York, N.Y.

Mar. 14-18: NACE 16th Annual Conference and 1960 Corrosion Show; Dallas, Tex.

Mar. 23-26: Electrical Industry Show and Lighting Exposition; Shrine Exposition Hall, Los Angeles, Calif.

Mar. 29-31: American Power Annual Conference; sponsored by Illinois Institute of Technology; Hotel Sherman, Chicago, Ill.

Apr. 4-7: Annual Nuclear Engineering and Science Conference; New York Coliseum, New York, N.Y.

Apr. 5-7: Electrical Show for Industry; Cleveland Public Hall, Cleveland, Ohio.

Apr. 25-26: Maintenance & Plant Engineering Conference; Chase-Park Plaza, St. Louis, Missouri.

Apr. 25-29: American Welding Society Annual Meeting and Exposition; Biltmore Hotel, Los Angeles, Calif.

May 1-4: Air Conditioning and Refrigeration Institute (Board and Annual Meeting); The Homestead, Hot Springs, Va.

May 16-20: National Fire Protection Association Annual Meeting; Montreal, Canada.

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☐ Please send me your illustrated folder on Cyclotherm Steam Generators.

Circle 9003 inside back cover.

Specifically speaking about this issue

During the past year, many of our readers have written to ask if we plan to publish an index to our 1959 issues. So, by popular demand, we have done exactly this. The six-page index starts on page 37 and has all the articles we carried in 1959 listed alphabetically under the major topic headings of interest to plant and power services engineers.

In going over the index, you will note that we have covered each subject quite thoroughly. As an idea of the amount of editorial we have carried throughout the past year, it may be of interest to note that we carried:

- 49 items on air conditioning, heating and ventilating
- 80 items on steam generation. This includes such topics as feedwater treatment, boilers, stokers, etc.
- 131 items on electrical distribution
- 42 items on electrical generation
- Over 150 items on instruments and control
- 37 on lighting; 39 on insulation; 116 on piping valves, and fittings
- 59 items on mechanical power transmission

And that isn't all . . . You will find a wide variety of stories on other subjects such as Air Cleaning, Building and Equipment Maintenance, Diesel & Gas Engines, Fans & Blowers, Fuels, Heat Exchangers, Lubrication, Management & Engineering, Material Handling & Storage, Metals & Welding, Noise Control, Pumps, Safety & Fire Protection, Turbines & Steam Engines, Waste Disposal, and Water Supply & Treatment.

Oh, yes . . . We have listed all the nomographs that were published throughout the year.

Our cover story, this month, features the second in our series of Profiles. This time, we visited Wilson MacFarlane, Power Plant Supervisor at Celanese Plastics Co. in Newark, N.J. We found Mr. MacFarlane to be a highly interesting plant and power services engineer. During the interview, it came out that a big point in his maintaining a highly efficient operation was the education of his operators in the fundamentals.

How he does this and what the benefits have been, therefore, became the highlight of this profile.

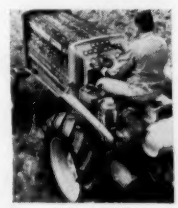
EDUCATION PAYS OFF

The importance of this subject — and our readers interest in it — is another thing that our readers have demonstrated during the past year. Their many letters and inquiries into the subject of "How can we train our operators? What courses, books, and other training aids are available?" are what is responsible for this story — and for a story that will be appearing next month. This latter story will tell our readers how they can go about getting home-study courses which are quite thorough.

A SHOT DOES IT

Also, while our editor was at Celanese, he picked up a story on how you can cut down condenser cleaning and cooling tower maintenance. The secret is in the device which is the subject of our lead-off story.

To keep you abreast of the latest in the power generation field, our managing editor has written a progress report on fuel cells. We think you'll enjoy reading about the latest application of these promising devices.



FUEL CELLS

W. A. Countryman

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JANUARY, 1960
VOLUME 2 NUMBER 1
(as Plant and Power Services Engineer)

Plant-Power Services Engineer

Serves the professional, technical, and practical interests of the engineers who design, install, maintain and/or operate the plant engineering services and power engineering services in industry, utilities, large service installations—and consulting and construction engineers and firms concerned with the plant and power services.

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RETURN LINE CORROSION *Can* BE LICKED!

Drastic reduction of return line corrosion in an easy, effective and economical way has been the unanimous experience of hundreds of plants throughout the country using Bird-Archer's Amine Treatment.

A plant in New York State, generating approximately 500,000 lb. of steam a day, had a normal condensate pH value of 6.3 that resulted in almost constant piping replacements. Only 6 lb. per day of Bird-Archer's Amine Treatment cut maintenance costs to a new low by raising the pH value to the safe range of 8.0 to 8.5.

A plant in New England, generating 600,000 lb. of steam a day, did not have an open feedwater heater which would mechanically eliminate the exceedingly high CO_2 content of their makeup water, consequently, the pH value of their condensate was sometimes as low as 5.9. Less than 12 lb. of Amine Treatment a day raises the pH value of the condensate to 8.5, eliminates excessive corrosion.

After two years of experience with Amine Treatment a power plant in Massachusetts, making 250,000 lb. of steam a day, enthusiastically reports that they eliminate over 75% of their piping replacements through the use of only 2 or 3 lb. a day of Amine Treatment.

Return line corrosion has been licked at these plants. Let a Bird-Archer Service Engineer help you solve *your* corrosion problems.

Write for Bulletin CP100 and the name of the Bird-Archer Service Engineer nearest you.

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Circle 9004 inside back cover.

REPORTS IN BRIEF

Energy, fuels seen as factor in cold war

Coal, oil and natural gas are vital factors in the Communist plan to surpass the U.S. in economics and industrial power within the next fifteen years.

"Energy Fuels . . . The Power to Win the Cold War" a review just published by the National Coal Policy Conference of Washington, D.C., graphically emphasizes the all-important role being played by these fuels in the current Cold War being waged by Soviet Russia.

The review advocates that the U.S. adopt a national fuels policy to insure that these vital natural resources are utilized to the best possible advantage in the national interest. A realization that some of the natural energy fuels in the U.S. are limited is essential.

The Communists attach tremendous importance to putting their energy fuels to the most beneficial use. An extract from the Soviet press stated in part, "Therefore, in working out a long-range plan for development of our national economy, we are providing for the extensive, but integrated use of oil, gas and coal for our power plants, industry and transportation . . . we intend to keep a very watchful eye on the country's natural energy fuels balance."

Fire prevention and protection handbook

A handbook on fire prevention and protection in industrial plants has been published by the OTS, U.S. Department of Commerce.

The manual was prepared by the Navy's Bureau of Yards and Docks for use of its personnel responsible for construction and maintenance of the Navy's shore installations.

Basic fire prevention measures covered include requirements for construction, emergency and protective features, and safeguards against common hazards. Special fire hazards are also discussed. General storage criteria are set forth, as are various methods of inside and outside fire protection, such as extinguishing, detection, and alarm systems. One chapter covers the special problems of fire prevention and protection during construction.

Special hazards discussed include chemicals and metals, welding and cutting operations, surface finishes, plastics, electricity, flammable liquids and gases, oil burners, rocket fuel, dust explosion and woodworking.

The 190-page publication "Fire Prevention and Fire Protection" may be ordered from OTS, U.S. Department of Commerce, Washington 25, D.C. Price is $3.00.

New officers elected to NEMA

The National Electrical Manufacturers Association has elected C. W. Paulson of Westinghouse Electric Corp., as chairman of the Room Air-Conditioner Section. He succeeds J. B. Ogden, vice president of sales, Airtemp Division, Chrysler Corp., who has been named to represent the Section on the Board of Directors of the proposed NEMA Consumer Products Division.

T. H. Ford, assistant to the executive vice president of Fedders Corp., has been elected vice chairman of the section.

R. H. Meyerhaus, Director of Engineering of Fedders Corp., has been named chairman of the Section's General Engineering Committee.

Study metal embrittlement with atomic reactor

Scientists at Argonne National Laboratory are using a research reactor to investigate a vexing industrial problem — why many metals become brittle and crack apart under stress.

Research at Argonne and elsewhere indicates that hydrogen atoms play an important role in the embrittlement process, by changing the crystal structure of metal atoms.

To illustrate the magnitude of the problem, it has been estimated that 20 percent of all the United States Liberty ships built during World War II were seriously damaged and in some cases destroyed by hydrogen embrittlement.

Argonne scientists are trying to find out what happens to hydrogen in metals, and why it acts the way it does.

They have found that hydrogen will penetrate metals left exposed to the air for long periods of time. Once inside, hydrogen atoms form bonds, or links, with the larger metallic atoms.

Since some of the bonds are stronger in one direction than another, metal has a tendency to "break off" when stress is applied along the edge of a bond.

The group ascribes embrittlement of metals to the directional nature of these bonds rather than to mechanical defects in metals such as the presence of pores, microcracks, fissures, intergranular holes, etc., which are mentioned often in technical literature.

One-coat system protects against corrosion

A protective coating has been developed and is said to combine the rust-inhibitive primer properties with the chemical resistance of a catalyzed epoxy coating. By affording both primer and topcoat corrosion-control qualities, the coating performs functions formerly requiring the use of two materials.

Material is said to withstand severe corrosive exposures and to make one-coat protection possible for process equipment in the chemical, paper and petroleum industries.

It requires only one brush or single-pass spray coat for a coating up to 10 dry mils in thickness. One cross-pass spray coat yields 20 mil dry film thickness. Cost per mil foot barely exceeds one cent. Flash point exceeds 100°F. Product can be applied by regular maintenance crews.

(One-coat coating is product of Prufcoat Laboratories Inc., Dept. P&PSE, Cambridge, Massachusetts.)
Circle 9005 inside back cover.

Cleans fuel oil from electrical equipment

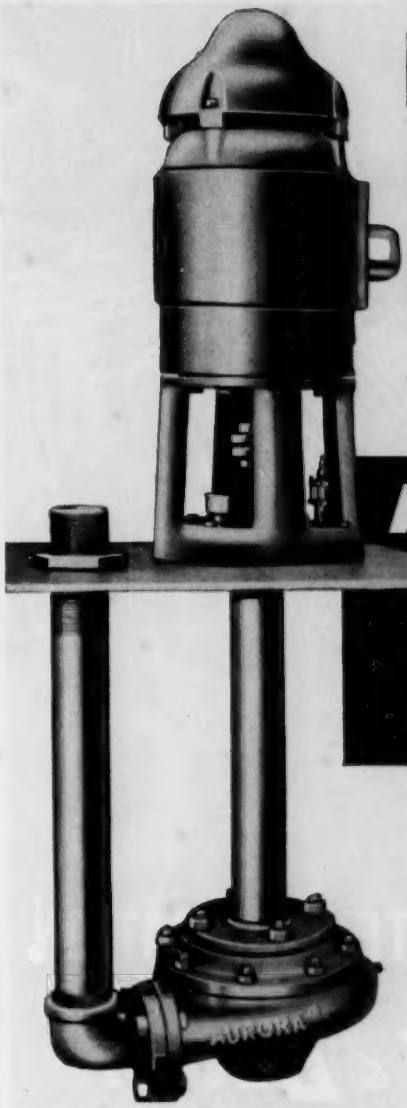
A cleaning composition that removes fuel oil from electrical equipment without harming insulation, metal, or humans and also acts as an antirust agent has been developed by the Navy.

The composition contains four components: hydrocarbon solvent, surfactant, penetrant, and water, plus a water-displacing composition developed earlier by the Navy.

It is said to be relatively harmless to electrical insulation, less flammable than the fuel oil, free of skin irritants, non-corrosive, and non-toxic. It also retards rusting of ferrous surfaces.

Also reported is a new procedure for salvaging electrical equipment after submersion in sea water contaminated with fuel oil.

Illustrated 21-page report "Salvage of Flooded Electrical Equipment" may be ordered from OTS, U.S. Department of Commerce, Washington 25, D.C. Price is 75 cents.



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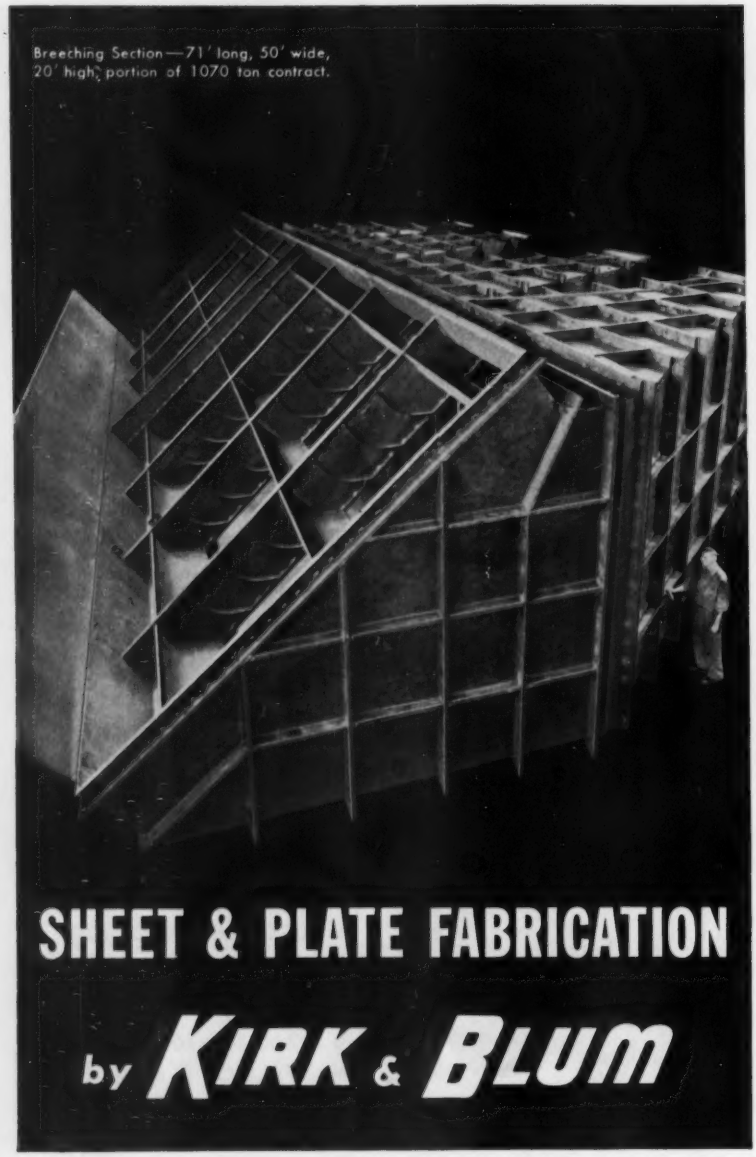

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Fused load interrupters should be re-evaluated

Matching metalclad switchgear to high-voltage industrial and commercial building requirements was the subject of a recent meeting of the General Meeting of the American Institute of Electrical Engineers in Chicago.

Speaking before the Industrial and Commercial Power Systems session, Charles H. Baker and John J. Mikos, both of S&C Electric Company, pointed out that thousands of the fused load interrupters have been used in the last 20 years with approval of local inspecting authorities.

Control sequence monitors blast furnace gas pressure

The problem of accurately controlling blast furnace gas feed to a five-fuel boiler system serving a South American steam-electric power station proved to be a challenge for the Hagan Chemical & Controls, Inc.

Any drop in gas pressure below safe requirements of the blast furnace had to be immediately detected, then followed by a shut-off of the gas flow to the boilers and a switch to the next available fuel supply.

To solve the problem, a combination electrical-electronic-pneumatic system for rapid response and correction was developed. Changes in blast furnace gas pressure levels are sensed by a variable-resistance transducer. A rectified voltage from a Zener diode is impressed across the transducer to produce a millivolt output proportional to variations in gas pressure. This output is amplified and transmitted to an electrical-pneumatic converter, which acts to shut off the flow of blast furnace gas when it falls below pre-set limits.

The Hagan control system was also required to select automatically the fuels to be fired in the prescribed order, and to suit the availability of the fuels as indicated by the fuel pressure.

Dielectric research at Bureau of Standards

To provide a better understanding of the properties exhibited by dielectric materials, the National Bureau of Standards is conducting a program of fundamental research sponsored in part by the Department of Defense.

Primary objectives of the program are to explain observed dielectric phenomena and to develop theories which can be used to predict the behavior of certain materials. In most of the work, a solid state approach is employed to probe the molecular behavior responsible for dielectric phenomena.

These studies are complemented by efforts to improve the accuracy of dielectric measurements in the fields of electricity, electromagnetic waves, electronics, solid state research, polymer studies, and physical chemistry.

ASA publications

The following ASA publications on conduit and electrical metallic tubing have been printed, and copies are available for immediate distribution:

1) Rigid Steel Conduit, zinc-coated, C80.1-1959, covers conduit protected on the exterior surface with a metallic zinc coating and on the interior with enamel, zinc, or other equivalent corrosion-resistant coating.

2) Rigid Steel Conduit, enameled, C80.2-1959, covers similar conduit with enameled exterior surface rather than zinc-coated.

3) Electrical Metallic Tubing, zinc coated, C80.3-1959, covers electrical tubing of steel.

All three standards give tables of dimensions and weights, coatings, and identification, as well as test and inspection procedures.

(Cost of the booklets is 80 cents per copy, and may be obtained by writing ASA, 70 East 45th St., New York 17, New York.)

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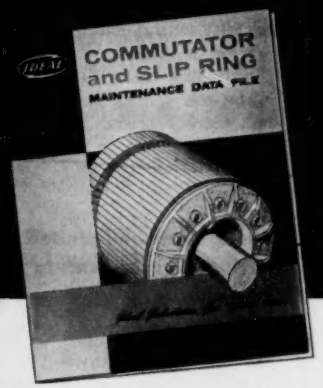
NEW SERIES

HOW-TO-DO-IT ARTICLES

on Commutator and Slip Ring Maintenance



Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

Each article discusses a major part of the overall problem — gives practical tips on maintenance — tells how to solve common problems — what to do and how to do it — in easily read shop language. Supplied in attractive folder, forming complete maintenance data file.

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Circle 9008 inside back cover.

Brackish water conversion sites

Ten sites for a brackish water conversion plant in the arid areas of the Southwest have been selected for further consideration.

The cities are Wichita Falls, Stamford, Ballinger, Monahans, and Pecos, Texas; Carlsbad, Roswell, Alamagordo, and Santa Rosa, New Mexico; and Safford, Arizona. The action is based on the recommendation of a special site selection board, appointed by Assistant Secretary Fred G. Aandahl.

The technical factors considered by the Board include terrain and bearings, climate and geography, proximity to saline water, brine disposal, zoning and surroundings, adequacy and management of local water, utility, power, fuel, materials, and labor costs, available transportation and utilities.

Russian power experts tour U.S. plants

A team of twelve power specialists from the Soviet Union are making a visit to electric power systems and equipment manufacturing plants in this country. The Russians are guests of the electric company groups and their members.

In addition to conventional steam and hydroelectric facilities, the Russians are seeing the nuclear project of the Yankee Atomic Electric Company and the Enrico Fermi Atomic Power Plant as well as plants manufacturing heavy electrical equipment in Schenectady, Pittsburgh, and Milwaukee.

The Russian visit is part of a technical and cultural exchange program established by the United States and the Soviet Union. Ten U.S. electrical industry executives recently completed a two-week hour of Siberia, the Urals, and Armenia, which followed (by a year) a two-week tour of European Russian power facilities in the summer of 1958.

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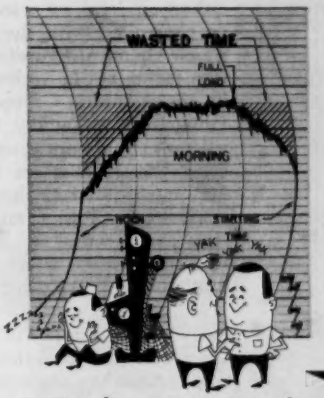
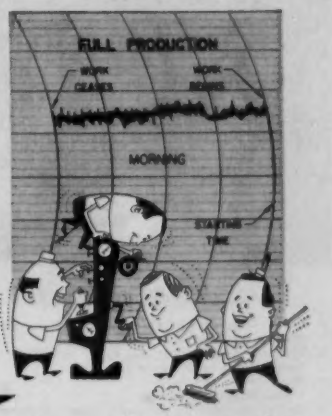


A Profitable "BEE HIVE"?



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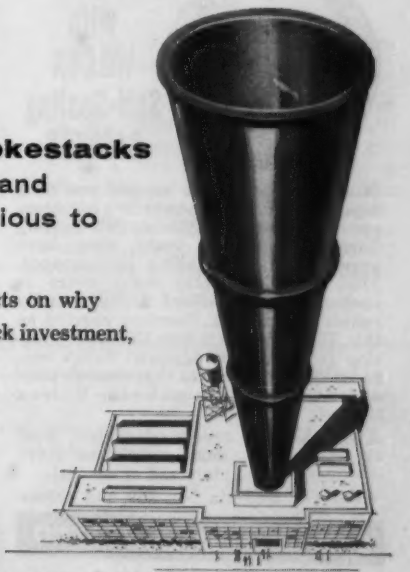

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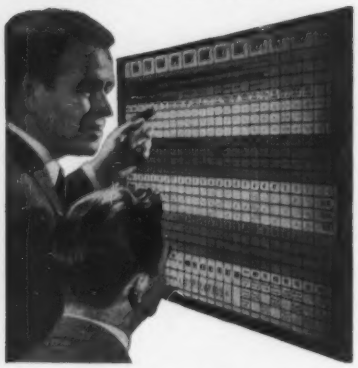

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Circle 9012 inside back cover.

Chemical can control dangerous fire hazards

Dangerous fire hazards created by gasoline and oil spills, either on land or water, can be controlled with the use of a new chemical hydrate emulsion formula, SLIX, developed by the Research Group of the Penetone Co., Tenafly, N.J.

Used as an anti-coalescing agent, SLIX shatters the oil film into globules, chemically coats each droplet and then isolates it with an area of non-combustible water of hydration. This SLIX-oil emulsion is now easily washed away with a stream of water. On water the turbulent flow will remove the dispersed oils.

Etchant simplifies bonding of Teflon

A fast, simple method has been developed for bonding Teflon to itself and to other materials.

Basis of the system is an activated form of sodium in solution which reacts with Teflon to form a carbonaceous film on the treated surface. This film then serves as a means of anchoring adhesives to the Teflon.

The compound has proved compatible with a variety of adhesives, including epoxies, phenol formaldehydes, and most of the rubber and silicone types.

Treatment time ranges from about five seconds to one minute, depending upon the type of application and conditions. Resulting peel strength with a typical epoxy adhesive runs from about 17 lbs per in on smooth Teflon to 35 lbs per in on corrugated ribbon.

Since no special equipment is needed, the process is ideal for field application as well as for in-plant work. It also lends itself well to production-line techniques, especially for continuous treatment of strip or Teflon-coated wire.

(Teflon etchant is product of W. L. Gore & Associates, Inc., Dept. P&PSE, 487 Papermill Rd., Newark, Delaware.) Circle 9013 inside back cover.

High temperature resistance thermometry

The National Bureau of Standards has been investigating the properties and characteristics of platinum resistance thermometers designed for use at temperatures above 630.5°C.

Experiments have been performed which show that it is possible to construct platinum resistance thermometers which have drifts of less than 0.001 degree per hour at 1000°C. To achieve this stability, it was found necessary to use platinum wire of the highest available purity for the temperature-sensing resistor, to support the resistor in a strain-free manner, and to use materials containing no silica for support and protection.

Subjecting the thermometer to mechanical shock tests and high temperature environments for long periods of time showed that the thermometer is stable and provides ample support for the platinum resistor.

Army approves small fire extinguisher

The U.S. Army's Corps of Engineers has approved a small, hand-held fire extinguisher that uses less than three pounds of a Du Pont brominated compound to do the same fire-fighting job on electrical and flammable liquid blazes that would require considerably larger quantities of the agents now in use.

Nitrogen is used as a pressurizing agent for Du Pont's "Freon-13B1" in the new extinguishers, providing an internal pressure of 400 psig at 68°F. That dispensing pressure is sufficient to provide operability at temperatures as low as minus 80°F. Army engineers' specifications for the new extinguisher require that it not only be operable between minus 65°F and 125°F, but also prescribe the size of fires which the extinguisher must be capable of quenching.

Under Engineer specifications, the extinguishers employing two and three-quarter pounds of "Freon-13B1" must be capable of extinguishing Class B (flammable liquid) and Class C (electrical) fires including a standard four-foot diameter gasoline tub fire; three 2-foot diameter gasoline tub fires in succession, without recharging, and a standard two-by-four-foot gasoline on cotton waste fire.

One of the biggest advantages of "Freon-13B1" is said to be that it has an Underwriters' Laboratories Class 6 toxicity rating, safer even than carbon dioxide and is considerably less toxic than Class 3 materials which include carbon tetrachloride.

Changes recommended in nuclear reactor safety procedures

Procedural changes to help reduce public controversy over nuclear reactor safety have been recommended by Lee Hydeman and William Berman of the University of Michigan Law School.

At present, they asserted, "Reactor projects are permitted to proceed too far before firm safety determinations are made." They pointed out that this can jeopardize both public safety and capital investment.

To avoid long drawn out hassles on reactor safety, Hydeman and Berman recommend that:

1) Organizations interested in establishing reactors should be required to discuss possible sites on an informal and confidential basis with the AEC before making any financial commitments.

2) Regulations should spell out how far reactor construction may proceed before a construction permit is issued and should establish more precise means for continuing review as construction progresses.

3) Reactor operators should be permitted greater flexibility in the early stages of reactor testing, before final safety determinations are made and construction is completed.

AEC surveys industry on process heat reactors

At a recent AEC sponsored symposium to determine industry views on low-temperature reactors to furnish industrial process steam, industry representatives favored further development of process heat reactors which would produce steam at up to 600 psi at a rate of 100,000 to 250,000 lb/hr.

Of the 67 responses to the questionnaire, 26 were by present or potential users of process heat, 18 were from constructors and/or engineers, 17 were reactor or reactor components manufacturers and/or designers, and 7 represented other types of organizations.

Most respondents would expect the nuclear reactor to be used for normal steam production, and conventional steam plants to be used for stand-by purposes or to meet peak loads. A preference was expressed for development of such reactors as cooperative projects between the AEC and industry, with the AEC providing the necessary research and development assistance, and industry contributing to construction costs. The majority stated belief that the government should take the lead in the development of economic nuclear process heat. Most frequent estimate of the time necessary for such development without AEC leadership was 10 to 20 years.

As a first step in the process heat reactor program, the AEC will cooperate with the Department of Interior in building a reactor in conjunction with a sea water distillation plant to be located on Point Loma, near San Diego, California.

Spring mechanism for closing low-voltage circuit breakers

A spring-actuated mechanism for closing low-voltage power circuit breakers has been developed by Westinghouse. Device permits manually operated breakers to be used with selective or delayed tripping in applications involving fault currents of 50,000 amperes and below.

It assures rapid, safe closing against all fault currents. Distinctive features include simplicity, ruggedness, and reliability. The spring-closing mechanism involves no latches or triggers and cannot stall or stick in any intermediate position.

Unit is applied to Westinghouse DB-15, DB-25, and DB-50 breakers for both fixed mounting and drawout mounting.

(Spring-actuated mechanism is product of Westinghouse Electric Corporation, Dept. P&PSE, PO Box 2099, Pittsburgh 30, Pa.)
Circle 9014 inside back cover.

Machines talking to machines

Automation which is still in the diaper stage, will reach maturity when machines can talk to machines, according to Dr. Allen V. Astin, director of the National Bureau of Standards.

Dr. Astin spoke at ceremonies dedicating a new, two-million-dollar research center of Leeds & Northrup Company at North Wales, Pa.

The development of simple sensing devices, Dr. Astin said, "bring the exciting possibility of the full use of 'feedback' as a practical principle in automatic control." He described feedback as "communication between man and machine and between machine and machine."

"Through these devices," he said, "a physical measurement can be made, analyzed, computed and compared to standards, and then sent on to alter or control an operation at another stage in the production process."

Dr. Astin said automation "carries with it the profound notion that man may delegate to machines certain limited types of decisions, including the technique of continuous sampling by sensing devices."

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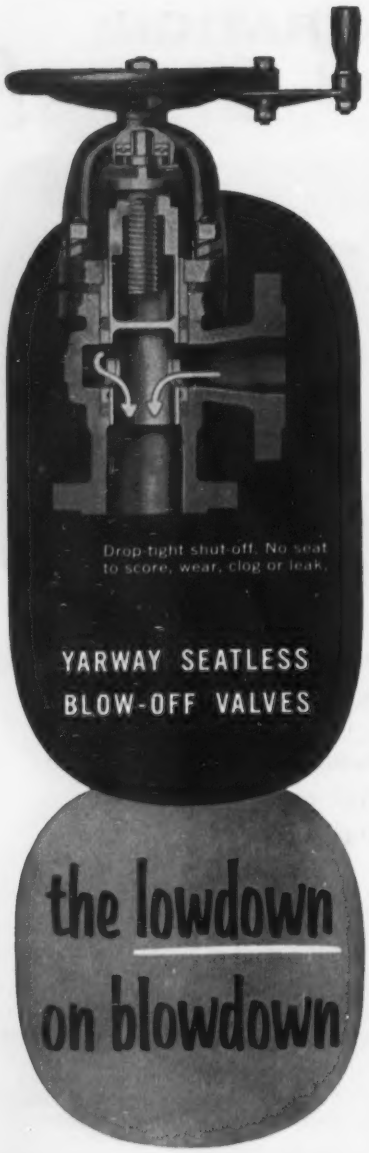

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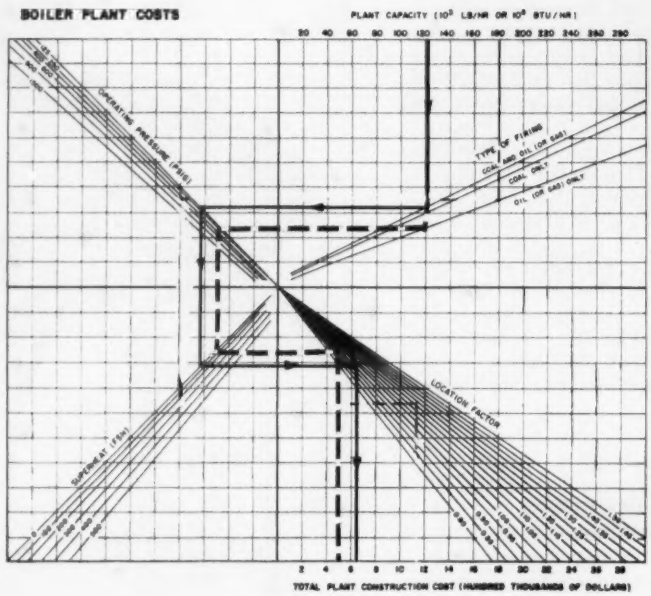
LETTERS

Your views are welcome in this column. Address "Letters, Plant and Power Services Engineer, 111 East Delaware Place, Chicago 11, Ill." Letters should be brief and confined to the editorial of this magazine or other topics of interest to the plant and power services functions.



Power plant cost charts back up fuel cost story

Congratulations on a very fine article "Here's a Lesson to be Learned from an Improper Cost Study" in the November issue of PLANT and POWER SERVICES ENGINEER. This article strikes close to home, since numerous similar cost studies prepared for boiler plants and power plants in the Naval Shore Establishment have been fraught with the same errors, obsolete engineering, failure-to-consider-all-plausible-solutions, etc., that you detailed in your article.

In addition to the annual operating cost errors, the $370,000 additional cost of the coal-fired installation was obviously absurd.

Using the graphical cost-estimating procedure of pages 29 and 31 in the March 1959 P&PSE (with a 1.04 location factor), the construction cost for the gas-fired 120,000 lb/hr plant would have been $490,000 as against $630,000 for the coal-fired plant. This $140,000 margin compares with the State's (of Kentucky) engineering estimate of a $130,000 differential.

JOHN W. BISHOP
Department of the Navy
Bureau of Yards and Docks

• *An illustration of Mr. Bishop's chart showing the cost comparison appears above. These charts have appeared in this magazine several times over the past few years. Each year, a table showing new location factors is published.*

In this particular chart, the solid line shows the determination of construction cost for the coal-fired plant; the dotted line for the gas-fired plant. As stated in the November story, the difference in construction costs could be "amortized in about 6½ years with the savings in coal operating costs."

— The Editors

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Circle 9018 inside back cover.

JANUARY, 1960
VOL. 2 NO. 1
Plant Power Services Engineer

Use of chlorinator in conjunction with turbine condenser circulating water system . . .

Controls Algae and Eliminates Costly Condenser Cleaning

GEORGE V. MICHAEL, Managing Editor
with W. F. MacFARLANE, Power Plant Superintendent
Celanese Plastics Company
a Division of Celanese Corporation of America
Newark, N.J.

SINCE 1948, the turbine condenser at Celanese Plastics Company had to be shut down every three months for cleaning. The sludge that would form in the tubes was the result of algae which grew in the cooling tower serving the system. The condensers are divided units so that one section can be cleaned at a time without shutting down the turbine altogether.

It took approximately 32 man hours to remove the heads, clean the tubes, and then replace the heads for both sections. The tubes were cleaned with an air gun using rubber bullets or by using a rod with cotton on the end.

In addition, it took about 16 man hours to scrub down the cooling tower. This job was done about every three months, too.

When the new cooling tower was designed, Celanese engineers specified wooden construction. The power plant then installed a chlorine-feeding device to discourage the growth of algae, and to keep the tubes like new.

Shock chlorine treatment eliminates the hazard of deliquification of wood and is recommended for this cooling tower.

Since the device was placed into operation three years ago, power plant personnel has had no trouble with sludge building up in the condensers or with growth of algae in the cooling tower. That's a saving of close to 200 man hours per year.

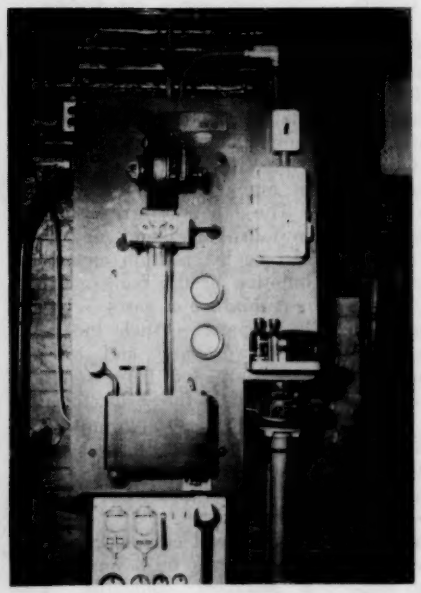
The device delivers a certain amount of chlorine into the condenser circulating system each day. The chlorine rate is manually controlled by the intensity of algae in the system.

A timer mounted on the chlorinator's panel automatically feeds the chlorine in for one hour each day. The pure chlorine comes from 105-lb (net) cylinders which are kept on a scale to keep track of the amount used.

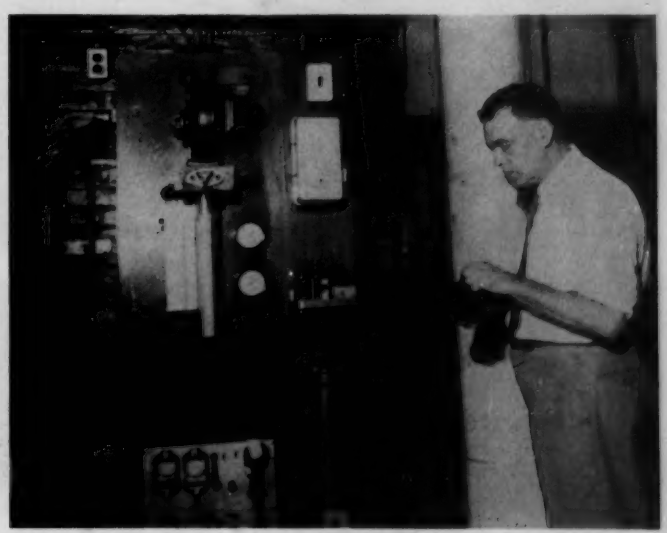
One cylinder will last about six weeks.

Besides the cooling tower, the circulating system consists of two 170,000-gallon reservoirs and extensive piping and pumping facilities. The chlorine, when fed into the system, goes into the condenser and then into the cooling tower.

Chlorinator is product of Wallace and Tiernan, Inc., Dept. P&PSE, 25 Main St., Belleville 9, N.J. This particular model is no longer in production. The manufacturer redesigned the unit when progressive changes in design advanced the art.
(Cooling tower used in this installation was manufactured by the Marley Company, Dept. P&PSE, 222 West Gregory Blvd., Kansas City, Mo.) Circle 9019 inside back cover.



Timer (top right) automatically feeds in pure chlorine for one hour per day from cylinder located just below the panel board. The gage on left allows adjustment of rate to feed in amount of chlorine in relation to the intensity of algae in water



Panel board of device which feeds chlorine into turbine condenser circulating water system to control algae growth. Before the device was installed, the condenser had to be cleaned about every three months. Since installation, the condenser tubes have remained like new. Here, Power Plant Superintendent, W. F. MacFarlane checks condition of water

FUEL CELLS GET A

Devices which convert fuel directly into electrical energy make the news again as Allis-Chalmers puts one to work powering a tractor

A P&PSE Report by **GEORGE MICHAEL,** Managing Editor

HOW would you like an energy source that will convert fuels directly into electrical energy at 90 percent efficiency without the usual problems of high heat, noise or large variety of equipment?

The answer may lie with scientists who are delving into the secrets of the fuel cell.

Fuel cells resemble other electric cells in that they consist essentially of electrodes and an electrolyte and produce direct current power. Unlike batteries, however, the fuel cell cannot store energy within the cell itself. It instantaneously converts chemical energy to electrical energy and does this at a much higher efficiency than batteries.

A total of 1008 fuel cells have been combined to power this standard model tractor. Reacting propane and oxygen gases (from tanks at rear) the device produces 15 kw to drive a 20-hp DC motor. Simple controller at driver's left regulates the speed and allows him to reverse the vehicle which has a drawbar pull of 3000 pounds

Fuel cells, essentially, take a fuel (hydrogen, natural gas, gasoline) and chemically react it with oxygen at low temperatures. To do this, you need an electrolyte and electrodes treated with a catalyst. The catalyst spurs the reaction so that it can proceed at room temperatures (although some fuel cells do require higher temperatures).

The chemical reactions within the cells cause a direct current to flow from the negative terminal of the cell to the positive terminal. This current can be used to drive an electric motor, light a lamp, or run electrochemical processes. There is no theoretical limitation on efficiency, and the possibility of producing electric power at an efficiency of 90 percent is real.

Several companies in this country are presently working to make fuel cells a practical thing. Among them are Allis-Chalmers, Consolidated Coal and Coke Company, General Electric, and National Carbon Company. The latter has produced cells for portable military radar units.

Recently, Allis-Chalmers made another move aimed at bringing the fuel cell out of the laboratory. Its engineers built one and put it to work driving an experimental version of one of their standard model tractors. The electricity that drives the tractor comes from 1008 individual fuel cells. These are joined in 112 units of nine cells each.

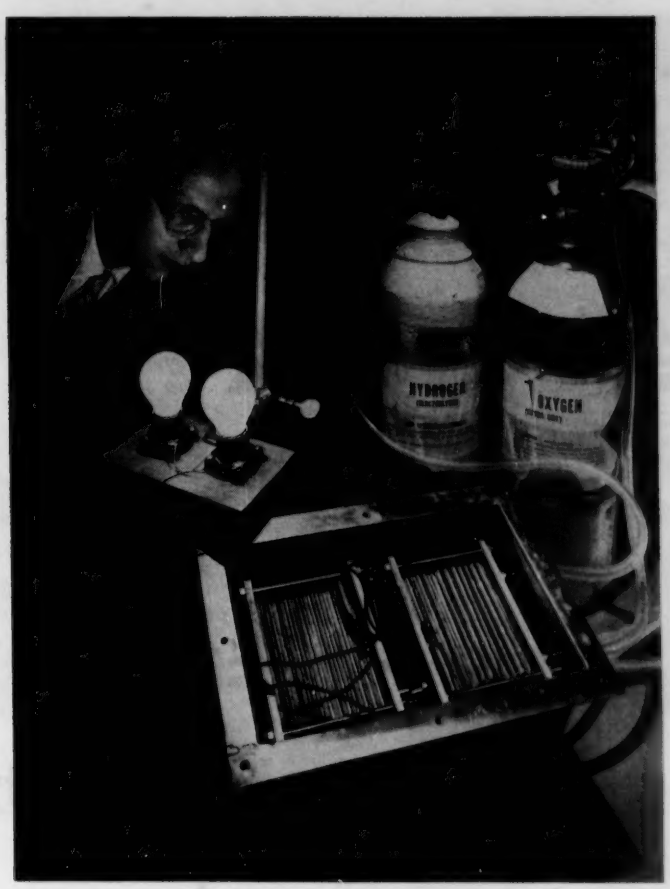
The 112 units are arranged in four banks and electricity can be taken from any combination of the banks.

A mixture of gases — largely propane — fuels the cells.

The propane and oxygen gases are fed from separate tanks into the cells through a system of tubing, and, once in the cells, they react in an electrolyte. A catalyst coating the electrodes of each cell aids the reaction.

The direct current produced is connected by a bus bar to a standard controller. The controller, measuring 8 by 11 by 21 inches, regulates the electricity supplied to a standard 20-hp DC motor to drive the tractor.

TRYOUT



Earlier applications of fuel cells have been the lighting of lamps or powering radio and radar sets. The simple construction and operation of the fuel cell places no theoretical limitation on its efficiency

The controller permits the driver to regulate speed or reverse tractor's direction by moving two levers. Using the speed control, the operator places the four banks of cells in series or parallel, varying the amount of current going to the motor.

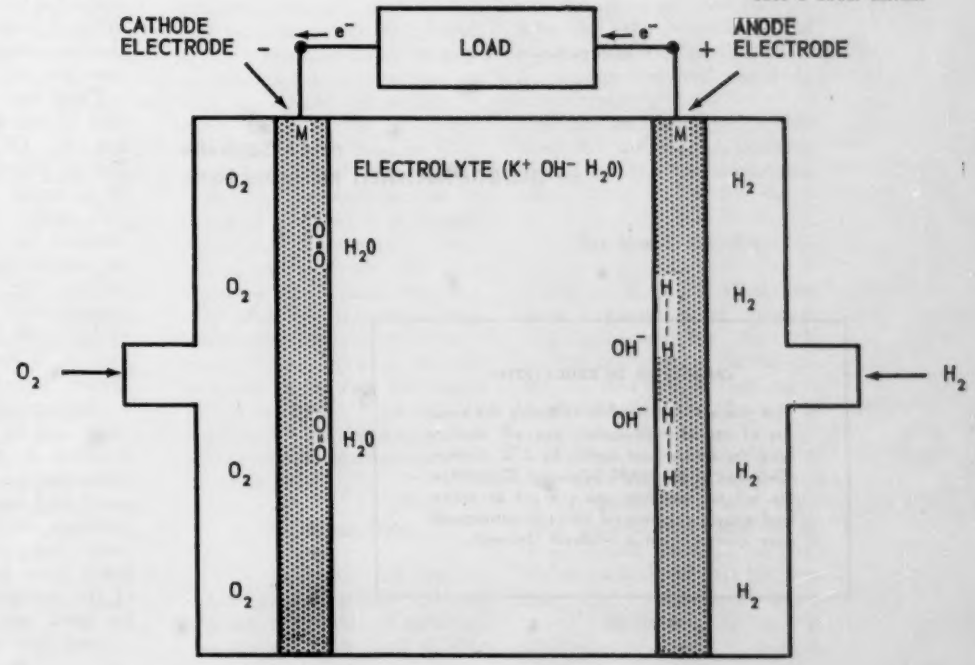
Each cell measures 12 inches square, is one-quarter inch thick, and produces approximately one volt open-circuit. Total electrical output is 15 kw.

Although they have recently played a big part in the power news picture, fuel cells are not new. What was probably the first fuel cell was described by Sir William Grove in 1839. The cell operated on hydrogen and oxygen.

Fifty years later, in 1889, particularly good results were reported by Ludwig Mond and Charles Langer, who obtained a current density of six amperes per square foot with essentially the same type cell.

Today, several types of fuel cells are being investigated — among them: direct fuel cells utilizing solid fuel, semidirect cells which use gaseous fuel, and indirect cells employing an oxidation-reduction system. ■

In a fuel cell, a fuel (such as hydrogen, natural gas, gasoline) reacts chemically with oxygen in the presence of catalyst-coated electrodes and an electrolyte. This low-temperature reaction causes electrons to flow from the anode to the cathode through an outside connection and produce a direct current



OPERATOR EDUCATION:

key to top-notch efficiency and safety

In this second 'profile', W. F. MacFarlane tells PLANT and POWER SERVICES ENGINEER how he educates his operators to become 'experts' and how such education benefits his operation

A P&PSE Profile
by **GEORGE MICHAEL,** Managing Editor

INTERESTED IN EDUCATION?

If you are interested in obtaining the benefits of operator education, you will want to read the article, next month, by J. D. Holmes, Chairman of the NAPE Education Committee. He will tell you how you can get an organized education program through correspondence courses from a Midwest University.

"THE POWER PLANT is a place where you can't afford to make mistakes. It is the very heart of industrial and manufacturing concerns. When it stops beating, all production ceases, and many persons are out of work."

These very true words were told to this reporter by Wilson F. (Mac) MacFarlane, Power Plant Superintendent of Celanese Plastics Company's plant in Newark, N.J. Because his job is to furnish an uninterrupted and efficient service, Mr. MacFarlane has concentrated on the very core of his operation — the operator — to make sure that the "heart" never fails.

"Equipment is only as efficient and as safe as the men running it. Only by proper education can they fully respect and appreciate the importance of their jobs and keep this plant going. We teach them how to take care of the equipment and how to be good operating engineers — and how to be 'experts'."

How successful has he been? We'll let his record speak for itself:

At the time of this writing, the power plant has operated 710 days without a lost-time accident. The National Safety Council awards attributing to this fact are proudly displayed in the plant's turbine room.

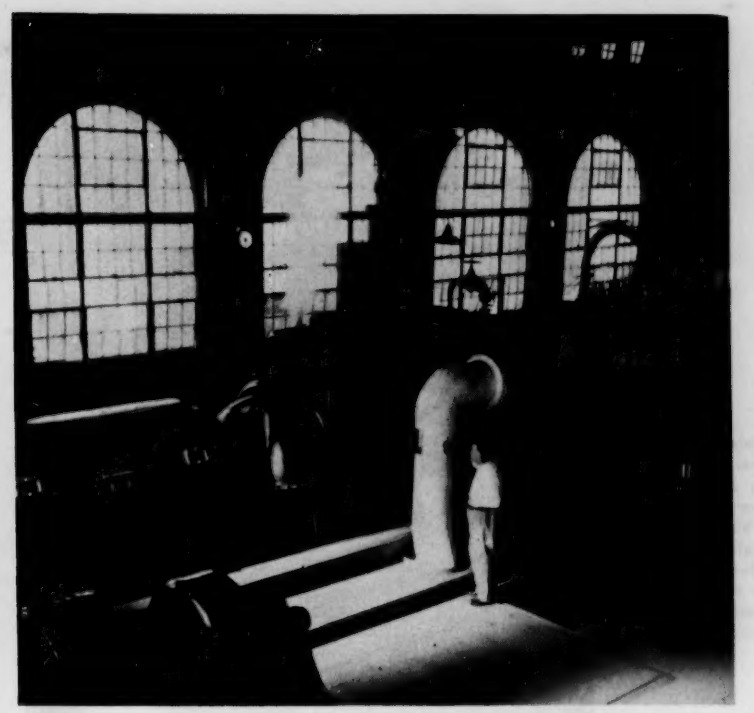
Another thing, in the 19 years he has been with Celanese there has never been a power shutdown due to any kind of breakdown.

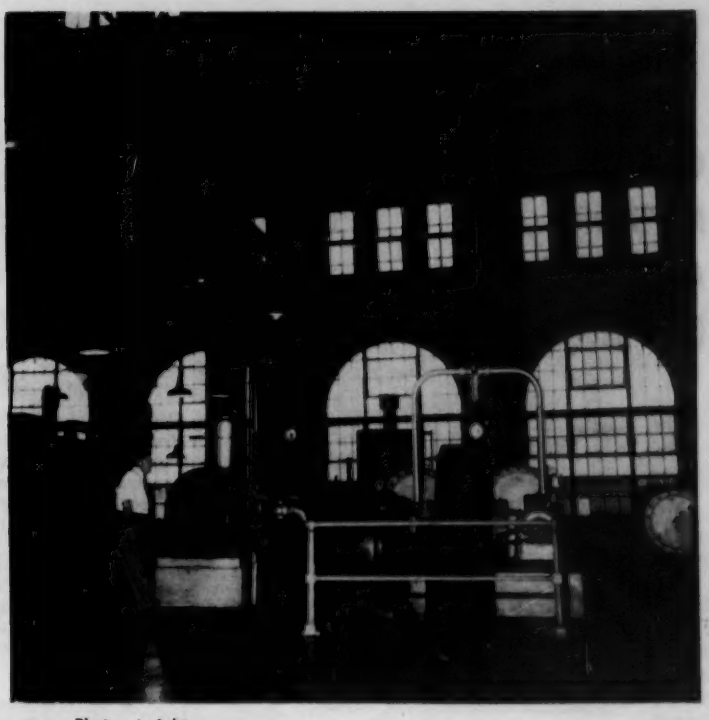
Power Plant Staff

The power plant staff consists of 19 men in the operating and maintenance crews. The plant is entirely under the charge of the salaried watch engineer, who is directly responsible to the power plant superintendent.

The operating crew is broken down as follows: four watch engineers, four firemen, three helpers, and four oilers.

The maintenance crew con-





Views of the engine or turbine room — Photo at right shows main turbo-generator for supplying plant electricity. Photo at left shows some of the compressors which supply plant air. In addition, his plant supplies hydraulic power, heat for plant and office, steam for processing, and well water cooling for manufacturing

sists of a chief maintenance mechanic and two mechanics.

The engineers have a total of approximately 115 years operating experience (this includes MacFarlane). The firemen have a total of approximately 75 years operating experience.

Training

Because this plant is one of the pioneers of higher pressure boiler operation for manufacturing plants in the state of New Jersey, the men have to be well-grounded in the complexity of this type of operation. At the time the first two high-pressure boilers and topping turbine were installed, the men enjoyed the distinction of being the first industrial power plant in this area to handle equipment at these pressures and temperatures.

MacFarlane is very proud of his mechanics. He has taught them welding and other important things. The maintenance crew can build its own smaller equipment and repair many of the machines in the power plant. An example of this is the recent installation of a continuous blowdown system which has resulted in the saving of $10,000, per year in operating costs.

The company's engineers purchased the flash tank, heat exchanger and other equipment, and Mac and his men installed it.

When the men are hired, MacFarlane gives them a course designed to familiarize them with the equipment and its operation. They are taken step-by-step through every phase of the plant's operation with stress on the how's, why's and when's.

He gives them books to read from his library and will ask them questions after they have read these books.

"I'll never let a man read a newspaper in this plant," says MacFarlane. "If they want to read something in their available time, we have plenty of technical magazines — like yours and my organization's (NAPE) — and engineering books."

If he runs across any basic articles, such as those on nomenclature or definitions, he will tear them out and pass them along to all the men. The articles will then be filed away for future reference.

If he finds articles of a practical nature, he will send away for tearsheets or reprints, so that he can pass them on to the more progressive men for their studying.

Another idea of how successful he has been in his program is the fact that some of his men have been able to "graduate" to become chief power plant engineers at other installations.

The Power Plant

This plant that has become such an excellent proving ground is capable of generating a peak steam load of 200,000 lb/hr. It has an aggregate nameplate rating of over 8900 kva/hr of electricity, and 2325 cu ft of compressed air per minute. It also can furnish heat for the manufacturing plant and offices, and hydraulic power, and well water to manufacturing areas.

A list of the major equipment in the power plant is given in the accompanying table.

The Man Responsible

Wilson F. MacFarlane has been a power plant operator practically all his life. He started out as a sea-faring engineer and ended up as a landlubber serving the last 19 years with Celanese.

He has held every type of job that can be found in a power plant. This fact makes him believe that none of his men should do what he can't do himself. It is this philosophy that has paid off handsomely in getting his men to

To next page

OPERATOR TRAINING PAYS OFF AT CELANESE

from page 16

Wilson F. MacFarlane of Celanese's Engineering Staff is the Power Plant Superintendent. He devotes all his time to supervising the power plant and an important part of his program is educating his operators to be "experts" in their work. Such education has played a major role in helping him to establish an excellent safety and performance record

participate in the training program.

At Celanese, he is on the Staff of Engineers, as Power Plant Superintendent, which is a full-time job. He is consulted on other projects when they pertain to the services he supplies.

The experience gained on the high seas has also paid off in making his plant a safe place to work. In the maritime service, he learned how important it is to keep everything clean. And, believe this reporter when he says that he has never seen a cleaner power house (see cover).

One of his biggest complaints is the "deplorable" situation of young operating engineers today. "They do not have the proper education in the practical things."

His interest in education has gone outside his own plant. He has lectured on high-pressure boilers, flash tanks, and electricity, and has been very active in the National and State Education Committees of the National Association of Power Engineers. This committee work — "to teach engineers their business" — has resulted in some programs in which all our readers will be interested. (Next month, P&PSE, will have an article by the chairman of that committee who will tell you how you can get organized courses for your operators.)

MacFarlane is not the only one in his family who is active in NAPE. His wife, Betty, is National President of the Women's Auxiliary of NAPE. ■

« « « « « « « « « Major Equipment in Celanese's Newark Power Plant » » » » » » » » »

— Four Combustion Engineering Co. Vertical Unit Steam Generators, 650 psig; will burn oil or pulverized coal; total capacity is 250,000 lb of steam per hr

— Ljungstrom Regenerative Air Preheaters and plate type air preheaters, Hagan Combustion Controls, on CE boilers

— Two 165-hp Moore steam-driven and one 200-hp motor-driven feedwater pumps

— Two 100,000 lb/hr Elliott Deaerating Heaters

— Hall Laboratories boiler water treatment services. Boiler water is checked every four hours for alkalinity, phosphate, silica, chlorides and total dissolved solids. Periodic checks are made on oxygen content

— Four vertical and overhead heating tanks

— Continuous blowdown system, which saves around $10,000 per year in recovery of waste heat

— One Marley Cooling Tower beneath which are four reservoirs, each containing 170,000 gal of water; these contain circulating water for turbine condensers and storage for emergency fire protection

— Wallace & Tiernan Chlorinator to discourage growth of algae in condensers (see page 77)

— Four turbo-generators (2400 and 440 volts delivered):

- 4285 kva, Westinghouse, 625 psi inlet, 150 psi extraction and condensing unit; exciter attached
- 1875 kva, Allis-Chalmers, 150 psi inlet, straight condensing
- 1563 kva, Allis-Chalmers, 600 psi inlet, 150 psi exhaust; non-condensing; exciter attached
- 1250 kva, Allis-Chalmers, 150 psi inlet; jet condenser

— Hydraulic Service Pumps: Two Worthington Duplex Tandem Compound controlled at 2500 psig

— Five air compressors, total capacity of 2325 cfm:

- Fuller Rotary, 150-hp motor-driven, 2-stage, 840 cfm
- Ingersol Rand, single-stage duplex, belt-driven by 75 hp motor, 600 cfm
- Worthington, single-stage, double-acting, steam-driven, 636 cfm
- Fuller Rotary, 30-hp motor driven, two-stage, 150 cfm for boiler instrument air, with excess to plant
- Worthington, 5-hp, motor-driven, 100 cfm for stand-by

— Steam-driven centrifugal pumps for heating system:

- De Laval turbine and pump, 2500 gpm at 90 ft head
- Dayton Dowd turbine and pump, 200 gpm at 90 ft head

— Switchgear and oil circuit breakers

NEW SOLUTIONS

for your plant and power services problems

Wrought iron conduit handles tricky cable installation

Because they will encounter both corrosion and vibration — plus unusual thermal expansion forces — cables scheduled to run across a new bridge at West Hartford, Conn., had to be fully protected by conduit which would hold up under these conditions.

The 22,000 kv cables are heavy-transmission lead and neoprene; conduit used to protect them is made from wrought iron.

The 4-inch conduit emerges in three banks, four pipes wide, from a manhole on one side of the bridge. On the bridge, it forms two banks, six pipes wide and will be embedded in the concrete sidewalk. On the other side, another manhole receives conduit in three banks. The banks are anchored in both manholes by concrete.

Conduit was positioned by hand and joined with regular couplings into 288-ft runs. Stress relieving was done by heating the bends.

The conduit was then welded to reinforcing rods to give it a solid mass. This binding the conduit and grounding it to the lead sheathing in the manhole cut down electrolytic action that might be accelerated by separate pipe runs.

Conduit on bridges frequently encounters both corrosion and vibration. Vibration tends to loosen a flaky corrosion product from the surface of the metal.

So the dense, adherent nature of the initial corrosion product which forms on wrought iron is an asset in conduit services, for the hard, well-bonded layer of oxide is hard to shake loose.

Because the conduit will be embedded in concrete, thermal expansion was also a factor. The wrought iron's rate of thermal expansion is nearly identical to that of concrete.

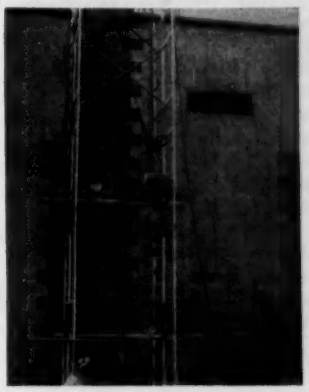
(4-D wrought iron conduit is manufactured by A.M. Byers Company, Dept. P&PSE, Pittsburgh, Pa.)
Circle 9020 inside back cover.

Wrought iron conduit has almost the same rate of thermal expansion as concrete in which it will be embedded

Foamed silica stops lining failures in incinerator chimney

When the refractory brick lining of the incinerator chimney failed at Silverstein's Bakery, Ltd., of Toronto, the chimney walls began to overheat and the company was faced with a hazardous problem.

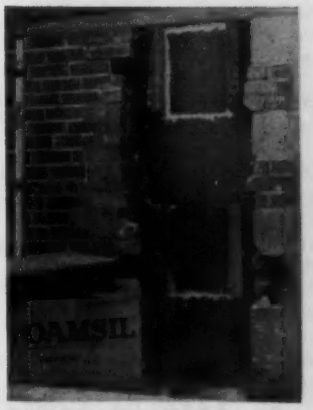
The incinerator is used for disposing of inflammable refuse and sweepings from the plant. Temperature changes can be quite drastic, ranging from 1000°F at its base to lower temperatures farther up the stack. Since feeding is not constant, temperatures can cycle from hot to cool several times a day. These conditions caused the refractory lining to crack and set up the hazardous condition.



Cracked stack lining was removed through openings and new lining of foamed silica blocks installed

On the advice of chimney and incinerator contractors, it was decided to remove the damaged stack lining entirely and replace it with a lining of a foamed silica material.

Due to the unusual characteristics of the material, it was possible to incorporate several unusual design features. With a coefficient of expansion of only .00000035, the problem of cracking due to "thermal shocking" was eliminated. The material can cycle from −450°F to 1600°F with no ill effects.



Large foamed silica blocks are utilized by jogging every other layer in alternate directions. Blocks provide lateral support and insure an air space around the lining

After the old lining had been removed, the new lining was installed in approximately one working day. Due to the insulating qualities of the material, only 2½-inch thickness was required, which meant the stack now had a larger cross-section area.

Taking advantage of the material's strength (200 lbs/sq in compressive strength) and light weight (12 lbs/cu ft), the contractor was able to install the large 17" x 22" blocks so that every other course projected out into the chimney area to act as lateral support and also to insure an air space around the lining.

Lining blocks were cemented on edge with a cement which has the same characteristics as the foamed silica blocks. Since the material cuts easily, there was no difficulty fitting to the inside of the chimney.

(Foamsil insulation is a product of Pittsburgh Corning Corporation, Dept. P&PSE, One Gateway Center, Pittsburgh 22, Pa.)
Circle 9021 inside back cover.

Easy-to-install rubber pipe resists corrosion

Discharge of processing wastes from a chemical plant into the lower Delaware River was recently solved by installation of one of the longest lengths of large diameter rubber pipe.

The line was installed from an off-shore dredge which first scooped out a trench for it on the river bottom. Successive 50-ft flanged lengths were bolted together, using corrosion-resistant bolts and nuts. Flexibility of the line simplified the bolting operations. The free end was just lifted out of the water, without disturbing the sections already in place, and attached to the next length on the dredge. Then the dredge backed off one pipe length and dropped the newly-attached length in place. A heavy cast iron collar bolted to each rubber pipe anchored it to the bottom.

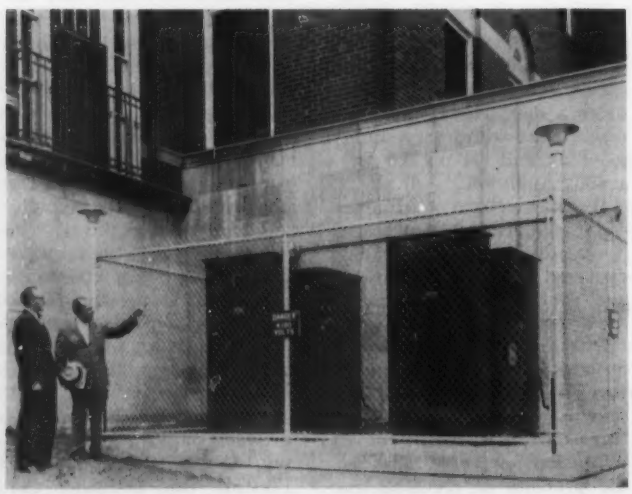
The procedure was far simpler than underwater bolting or welding that would have been necessary with a metal pipe-line. An unprotected metal would have a relatively short life in the Delaware River at this point because of salt water corrosion, plus corrosion from the mineral acid wastes.

Method of disposal was developed by the chemical firm's engineering department as a conservation measure. It provides for rapid dispersal of wastes by discharging them into the faster moving river channel, rather than directly offshore in shallow tidewater.

Although operated as an open-end 12-in diameter pump line, the rubber pipe is designed to withstand 100 psi. This strength is provided by a nylon and steel wire carcass. A neoprene cover is used for protection against external damage, above or below water. Depending upon the tides, 50 to 80-ft of the line could be exposed to weathering and floating debris. The neoprene covered pipe-line is expected to last maintenance-free for the lifetime of the present waste disposal facilities.

(Condor flexible rubber pipe is development of Manhattan Rubber Division, Raybestos-Manhattan, Inc., Dept. P&PSE, Passaic, N.J.)
Circle 9022 inside back cover.

Workmen prepare to connect two sections of flexible rubber pipe. After lengths were bolted together, dredge backed off one length and dropped new section in place. Cast iron collars anchor pipe to the river bottom



These are two of six substations that have tripled capacity and improved service continuity at Bryn Mawr Hospital

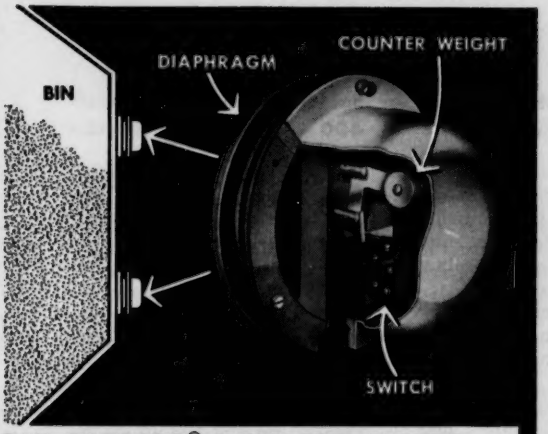
Packaged substations give hospital continuous, economical service

Six small units permit load switching, can be located close to load areas

Ingenious use of six small packaged substations, instead of one or two large units, has improved continuity of service and afforded lower cost protection and better operating economy in a recent expansion of electrical distribution facilities at Bryn Mawr Hospital, Bryn Mawr, Pa.

The substations, which transform incoming high-voltage power to distribution voltages, triple the hospital's available power and will accommodate future expansion of the 66-year old institution.

Units are completely pre-engineered load centers containing transformer, and primary and secondary control and protection equipment. Because they are packaged, a minimum of installation time



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Circle 9023 inside back cover.

IS YOUR INSTRUMENTS LITERATURE FILE INCOMPLETE

A new bulletin on instruments is being offered. You'll find a review of this bulletin in the NEW LITERATURE section, starting on page 28. This bulletin is just one of some 50 selected pieces of plant and power services literature reviewed in this issue.

is required and no special engineering is needed.

Prior to the modernization, the hospital's total incoming power capacity was 900 kva, of which 450 kva was in immediate need of replacement because of age. Also, the recent addition of a new wing, and general increased use of electrical power, made expansion and modernization of the electrical system mandatory.

System now provides a total of 1650 kva capacity — ample for present needs and well into the future. When this becomes inadequate, additional substations can be added to the system to increase capacity to virtually any desired amount.

Two pairs of packaged units, supplying lighting and power service, are located inside and outside the main hospital building. Each pair consists of a 150 kva unit and a 225 kva unit. Like units are connected by bus ties which permit transferring loads either way in case of a power failure on one unit.

An outdoor 225 kva unit is located at the boiler house to supply it with lighting and power service. In an emergency, this unit can handle part of the hospital's load.

The sixth unit, a 225 kva substation, is located in the maternity building — supplying lighting and power services to this building.

All indoor units incorporate ventilated dry-type transformers. Outdoor units employ askarel-filled transformers.

Use of several small units permits switching loads between units, to assure that service is maintained in emergencies. Because smaller units carry smaller loads inexpensive molded-case breakers were used for secondary protection.

Units are placed close to load areas, allowing power delivery at higher voltages and correspondingly lower line losses.

("Tranfo Units" are development of I-T-E Circuit Breaker Company, Dept. P&PSE, 1900 Hamilton St., Philadelphia 30, Pa.)

Circle 9025 inside back cover.

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Circle 9026 inside back cover.

NEW DEVELOPMENTS

for

effective plant and power services operation

Screw conveyor drives have optional trough end, motor mount

Compact helical gear drive is designed especially for screw conveyor installations. Various drive assemblies can be furnished from stock — basic drive (reducer with drive shaft and seal housing) can be combined with standard trough end as well as with a special motor mount offered by the manufacturer.

Trough ends, available in eight sizes (6″ to 20″) bolt to any standard trough. The all-steel, pre-drilled motor mount provides convenient method of mounting any NEMA foot-mounted motor within rated capacity of the reducer.

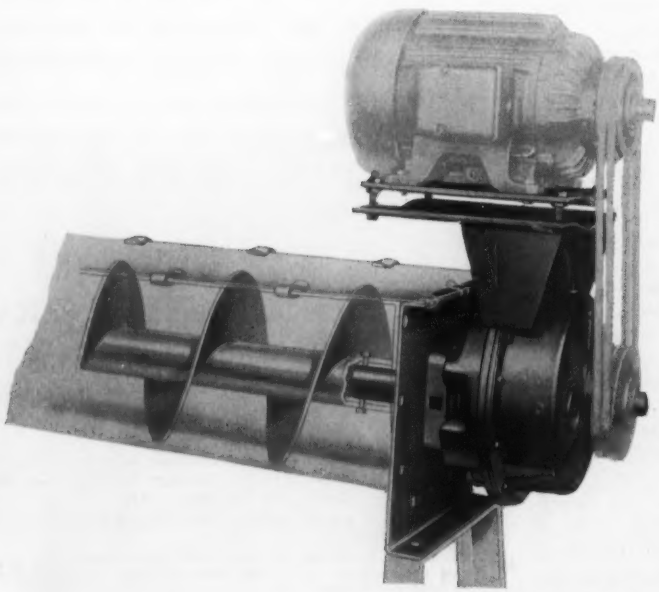
Choice of seals (waste packing, felt seal, or lip seal, either leather or neoprene) is offered between conveyor and reducer, to suit the conveyed material.

The drives are manufactured in six sizes, each with ratios of 4:1, 9:1, 14:1 and 24:1 for all conveyors requiring ½ to 30 hp.

Drive shafts are removable, by means of a quick snap ring arrangement; in many cases, they can be removed without disturbing reducer or screw.

Tapered roller bearings absorb thrust from the screw conveyor, thus eliminating need for thrust bearing on trough end.

(Screw conveyor drives are products of The Falk Corporation, Department 255, Box 492, Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9027 inside back cover.



Six sizes each with four ratios are available

Cleans clogged boilers and seals leaky ones

Two newly developed compounds recondition heating systems — one by removing accumulated boiler rust and sludge, the other by sealing leaks without shutdowns.

Test data indicate that the cleaning compound's action is physical rather than chemical. It removes rust and sludge caused by corrosion and water impurities in old boilers and loosens core sand, oil and dirt common to new boilers.

Cleaning and sealing compounds come in liquid and powder forms

At the same time, it coats boiler walls to protect against further accumulations of impurities.

It vaporizes as it cleans, and gets through the entire heating system to clean lines and heating units, too.

The sealing compound works by finding its way to existing boiler leaks, sealing them immediately.

It mixes readily with boiler water, and boiler pressure causes it to form a permanent bond that becomes an actual part of the boiler. The seal is not affected by expansion or contraction.

Both products have been safety-tested. They are available in liquid and powder forms.

(More information on "Heat-Pep" Cleaner is available from J. A. Sexauer Manufacturing Co., Dept. P&PSE, 2503-05 Third Avenue, New York 51, N.Y.)
Circle 9028 inside back cover.

("Heat-Pep" Sealing Compound is manufactured by J. A. Sexauer Manufacturing Company, Dept. P&PSE, 2503-05 Third Avenue, New York 51, N.Y.)
Circle 9029 inside back cover.

Safety switch rated 400 — 1200 amp

Line of heavy-duty safety switches incorporates the quick-make, quick-break principle. They are rated from 400 amp through 1200 amp and have a 100,000 amp interrupting capacity when current-limiting fuses are inserted.

Essentially, they are manually operated circuit interrupters employing a circuit-breaker-type operating mechanism in conjunction with fuses. The fuse holders are designed to accept either standard NEC fuses or current-limiting fuses.

Chief feature is "teaseproof" operation. The mechanism drives the contacts into position accurately in less than one cycle, thus assuring longer contact life, cleaner contacts, and more reliable performance.

Other features are visible blades, which afford maximum safety by eliminating any doubt as to whether the switch is on or off; lever handle action, which requires less that a 60° throw to operate the the interlock and switch mechanism; deionizing arc quenchers; and high-pressure fuse clips.

Three different sized enclosures are available — one for 400a and 600a switches, another for 800a units, and a third for 1200a units.

These enclosures feature knockouts on the bottom, top, sides, and back to meet any installation problem; a viodable interlock; raintightness and unit pole construction.

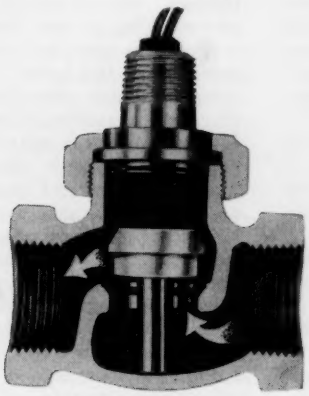
(QMQB Safety Switches are manufactured by Federal Pacific Electric Company, Dept. P&PSE, 40 Paris St., Newark 1, New Jersey.)
Circle 9030 inside back cover.

For more information on items reported in the New Developments section circle corresponding numbers on reader service card inside back cover.

Flow switch is easy to install

Flow switch provides positive indication of flow, loss of flow, or excessive flow of any liquid or gas through a pipe line. It will operate on a very low pressure differential and can be easily installed in any pipe line with ordinary tools.

Designed for use in circulating or by-pass systems with hydraulic, lubricating, cooling, ventilating and other supply lines, the switch can be arranged to actuate a pilot light,



For hydraulic, lubricating, cooling, ventilating lines

horn or other visual or audible remote warning signal. With suitable relays, it can also be arranged to operate interlocks or other protective devices.

Standard units — available from 1" to 3" pipe sizes — are red brass, and other sizes and materials can be provided for practically any application.

They are hermetically sealed in glass and are explosion-proof and corrosion resistant. Magnetic snap action insures instant response with positive make and break.

Standard circuit is normally closed in "no-flow" condition, but other circuit arrangements can be supplied on order. They are rated 0.5 amps resistive or inductive for 28v DC, or 10 watt load at 115 to 230v AC.

(Model FS-200M Flow Switch is product of The Gems Company, Inc., Dept. P&PSE, 85 Market Square, Newington, Conn.)
Circle 9031 inside back cover.

Assures adequate air supply to boiler

Compensating flue system has been developed to meet the requirement of any blast-fired gas furnace, boiler or other heating device for a minimum of 10 cu ft of air for each 1000 Btu of fuel burned.

Since combustion equipment is frequently operated in closed locations with insufficient air available, the burners may burn poorly and, in extreme cases, may even go out. With this system, all of the air required by the combustion system is replaced by new air entering a sleeve opening through the roof.

Design of the fresh-air sleeve is such that it not only insulates the hot exhaust flue from contact with the roof but provides partial preheat of fresh air coming into the boiler or furnace room.

The system features twin dampers controlling flue and air inlet openings at the same time and by the same operator. Dampers may be controlled by limit switches linked on the same control. This permits simultaneous opening and closing of both the flue outlet and air inlet.

An optional limit switch may be installed on the damper lever to insure that the dampers are open before burners are ignited.

The system permits safe operation without requiring wall openings, special ductwork, or open doors and windows.

(Compensating Flue System is development of Eclipse Engineering Company, Dept. P&PSE, Rockford, Ill.)
Circle 9032 inside back cover.

Measure hydrocarbon impurities in gases to 0.1 ppm

Completely self-contained, portable instrument gives rapid analysis of total organically bonded carbons in atmosphere or gases.

Suitable as an atmospheric monitor for air pollution or lower explosive limits, the unit will also serve as a leak or impurity detector.

Sensitivity of the instrument is better than 0.1 parts per million for such organic carbon compounds as hydrocarbons, alcohols, ketones, etc. It is completely free of interference from backgrounds such as water vapor, oxygen, nitrogen, carbon dioxide and rare gases. It may

Response time is less than two seconds

be adjusted from as low as 0 to 1 ppm up to 0 to 10%.

Response time is less than two seconds.

This is how the instrument works: A metered flow of sample is fed into a hydrogen flame in an enclosed chamber. The flame ionizes combustibles in the sample to make changes in current flow of a surrounding electrical field.

These changes are proportional to total carbon content of the sample. Results are read out on a meter or an attached milliamp or millivolt recorder.

Housed in a suitcase-type enclosure of aluminum, the unit measures 18 x 13 x 8 inches and weighs 47 lb fully equipped with batteries and air, hydrogen and standardizing gas cylinders.

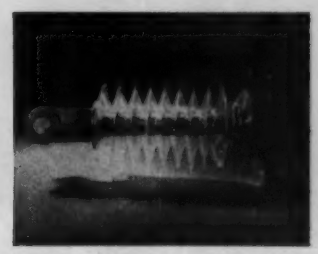
Air supply, with normal operation, will last 18 hours; hydrogen supply and batteries have average service life of 180 hours; and calibrating gases will last a year.

(Model 213 Hydrocarbon Detector is product of Perkin-Elmer Corporation, Dept. P&PSE, Norwalk, Conn.)
Circle 9033 inside back cover.

Protects hydraulic, air cylinders

As protection against corrosive liquids, abrasive grits, dusts and sludges, plastic boot fits on reciprocating rods, such as those of existing hydraulic or air cylinders. Because the boot can be transparent, any oil leakage is trapped and made evident.

Available in various shapes, sizes and colors, the boot affords minimum thickness for a given expansion. Often it fits the cylinder without



This particular bellows has 1-inch ID by 3-inch OD and expands freely to 6 inches

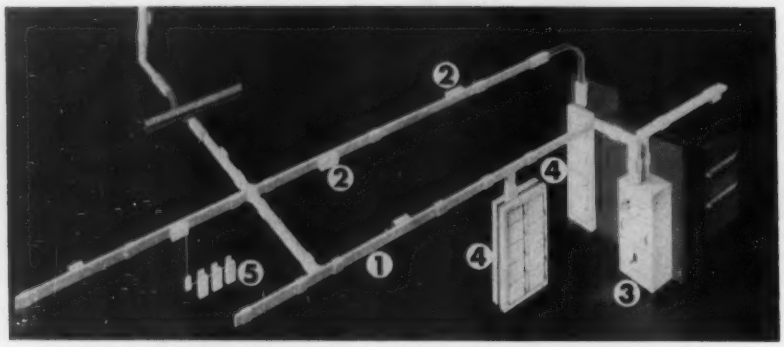
cutting down the stroke. For example, with a film thickness of only 0.008 inches, it is practical to provide 13 convolutions in a space of less than ¾ inches, including end connections.

Materials of construction include: vinyl film, vinyl-coated nylon fabric and polyethylene film.

(P-F Plastic Film Boot is product of A. F. Gagne, Associates, Dept. P&PSE, 50 Wall St., Binghamton, N.Y.)
Circle 9034 inside back cover.

Pre-fabricated distribution system features 'total' safety

Electrical distribution system including busways, motor control centers, switchboards and safety switches provides improved power transmission, efficiency, simplified design and complete safety to personnel



IN A TYPICAL INSTALLATION, as the low voltage current flows from transformer, it is conveyed to service entrance equipment (3) through feeder-type bus. The service entrance is the main distribution center and is a compact factory-built, free-standing or wall-mounted steel enclosure, containing full circuit protection and metering equipment. From distribution center, power passes into plug-in type busway (1) for transmission to all parts of the system. Power is efficiently taken from the bus through plug-in units (2) that may be located almost anywhere along the bar. These units are available as branch circuit units with many combinations of fuses, switches, air circuit breakers, motor controls, capacitors, and transformers. Plug-in power accessibility has been brought down to working level via sub-distribution centers (4) and safety switches (5)

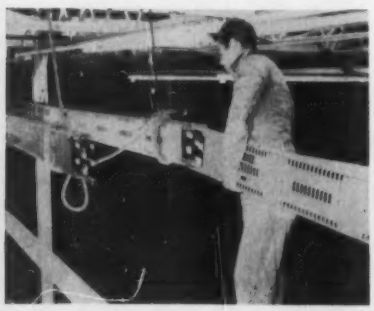
IN a newly designed, pre-engineered electrical distribution system for industrial plants, commercial buildings and institutions, it is impossible to touch a live part anywhere.

This is due to its safety slide and retractable plug-in contact operation which is not limited to the busways but is carried throughout to bring same safety down to the working level in motor control centers, switchboards, motor starters and enclosed switches.

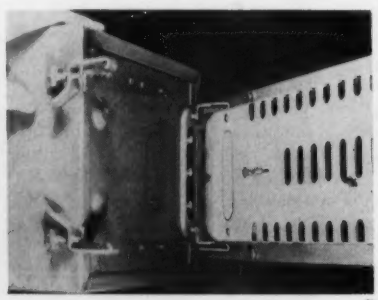
This three-step safety consists of: safety slide that covers bus bars and which cannot be opened until plug-in unit is installed on busways; when plug-in is installed and safety slide is open, interlocks prevent removal of plug-in device; retractable stabs make contact with bus bars when handle is "on" and door to plug-in unit cannot be opened. Plug-in unit must be "off" to be attached or removed from bus bars.

Standardized sub-distribution centers receive a variety of plug-in units to make them perform the same electrical functions of several products used in conventional systems. For example: by altering the electrical components in the plug-in units, the center can perform the same functions as conventional motor control centers, switchboards, distribution panelboards and even, on occasion, service entrance equipment.

Each standardized component permits stock delivery from warehouse. This concept of "shelf-engineering" eliminates costly, highly engineered products and systems and produces products which

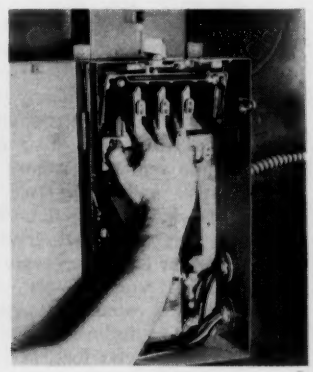


A



B

C



D

FEATURES OF DISTRIBUTION SYSTEM

Light-weight, compact busways are easily assembled (A) by plugging together standard sections. There are 12 power outlets in a 10-ft section of bus, and plug-in devices clamp easily (B) to energized bar with complete safety to personnel. Plug-in feature is carried throughout the system (C) to bring same safety down to working level in motor control centers, switchboards, motor starters and enclosed switches. This complete safety is dramatically demonstrated (D) as worker thrusts his hand into a plug which is installed on receptacle "live" with 220 volts. Flexible connectors (E) are used to join components in odd-shaped locations

are smaller and lighter.

The busways have a duo-circuit arrangement combined with close bar spacing to give high momentary short-circuit strength and low impedance. All aluminum or copper conductors are fully insulated to eliminate power arcs.

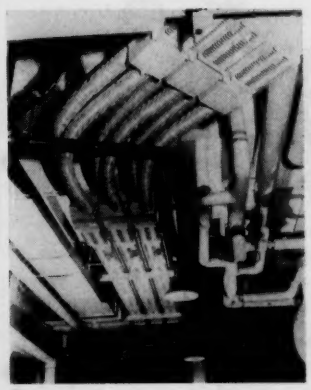
They feature one standard housing dimension for ratings through 1000 amp, 600v, in both feeder and plug-in types. Standard, straight lengths are five and ten feet. Straight connecting lengths are available in 20, 25, 30, 35 and 40 inch sections. The plug-in bus has 12 power outlets in a 10-ft section.

Another feature is flexible connectors which allow the system to be installed in odd-shaped locations without the need for complex engineering drawings. In addition, a complete selection from stock of standardized dimensional rigid elbows, tees and crosses is available.

The bus is available in ratings of 225, 400, 600, 800, 1000, 1350, 1600, 2000, 3000, and 4000 amps. Above 1000 amp capacity, it is furnished as factory-assemblies of standard, matched-impedance, lower-ampere-rated units in single or multiple enclosures.

Short-circuit ratings are 50,000 rms amp for bus up to 1000 amp; for higher capacity runs above 1000 amp, ratings range from 100,000 rms amp for 1350 amp to 200,000 rms amp for 4000 amp.

(Uni-Bus Masterguard system is development of Electric Distribution Products, Inc., subsidiary of Worthington Corporation, Dept. P&PSE, Allentown, Pa.)
Circle 9035 inside back cover.

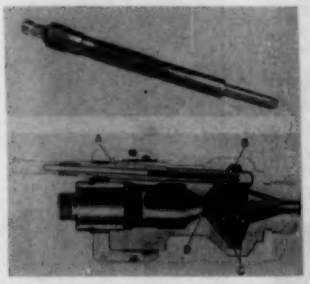


E

Aids in starting diesel engines

Pencil-like device, custom-made to screw into the combustion chambers of various makes of diesel engines, serves as a cold weather starting aid for diesel engines.

To use the device, the operator of the equipment pushes a button and holds it for three minutes. Power from a battery raises the surface temperature of the heating element to 1800-2000°F, thereby heating the fuel to permit easy ignition.



Schematic (bottom) of starting device shows threaded metal sheath (A), heating element (B) protruding into pre-combustion chamber (C), and fuel being ejected from spray nozzle (D)

The Inconel-tube sheath, which encases part of the heating element, resists scaling at the high temperatures, and embrittlement and attack by carbon deposits which may form in the pre-combustion chamber.

(More information on the "Glow-Plug" may be obtained from General Electric Company, Dept. P&PSE, Schenectady, N.Y.)
Circle 9036 inside back cover.

Self-curing zinc coating takes less time to be applied

Savings in application time are possible for an inorganic zinc coating because it cures itself to full hardness without the need of applying a separate curing solution.

It is applied over bare steel by brush, spray or roller, and a single coat, a few mils thick, gives complete protection to surfaces exposed to water, severe weather, salt spray and abrasion.

The material bonds both physically and chemically to the steel. It may be used wherever galvanizing is suitable. Unlike galvanizing, however, it can be applied to equipment already erected.

The coating sets hard and water-resistant in a few hours, and achieves maximum water resistance in several days. It is not affected by organic solvents.

Containing no volatile, flammable or toxic materials, it may be safely used in interior, poorly ventilated areas.

("Zinkote" is manufactured by Amercoat Corporation, Dept. P&PSE, 4809 Firestone Blvd., South Gate, Calif.)
Circle 9037 inside back cover.

For cleaning cooling coil surfaces and air filters

Chemical compound is designed for cleaning and restoring cooling capacity of cooling coils and cleaning permanent filters in air conditioning installations.

The material is a water-soluble blend of synthetic penetrants. When diluted with water, it provides a safe, odorless solution.

Easy to apply, the material in solution is sprayed on soiled surfaces and flushed off with water. A light film of the material applied after cleaning inhibits rust. It is harmless to paint and easily cleans access doors, packaged units and blower fans.

Material is sprayed on and rinsed off to clean coil and filter surfaces

Since it is non-evaporating, odorless, non-toxic and non-flammable, it can be used as an adhesive instead of oil to treat permanent type filters.

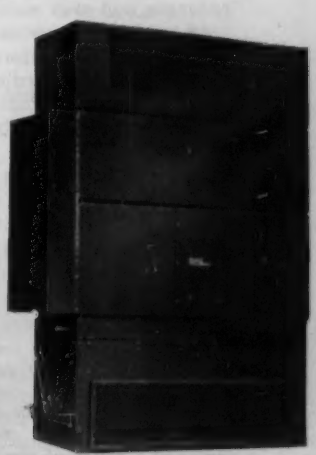
("Metalene" is product of Lester Laboratories, Inc., Dept. P&PSE, PO Box 4897, Atlanta 2, Ga.)
Circle 9038 inside back cover.

Heating, ventilating units are quiet

Large-capacity heating and ventilating units feature quiet operation.

The units are engineered specifically for applications such as auditoriums and offices where smooth, quiet operation is a necessity.

The units are available in nine sizes for low static applications (0" to ⅝"), and seven sizes for high static applications (¾" to 1¼") with capacities ranging from 1250 cfm to 15,000 cfm.



Nine low static and seven high static models are available

All models are equipped with a sound-absorbing plenum section with the fan motor internally mounted and are all available in horizontal, vertical or wall mounts.

("Seasonvent" is manufactured by McQuay, Inc., Dept. P&PSE, Minneapolis 19, Minnesota.)
Circle 9039 inside back cover.

Offers complete line of aluminum fittings

A complete line of aluminum fittings for schedules 10 and 40 pipe incorporates an extra-length feature. This extra length gives more clearance for welding, simplifies alignment, allows for flanging without welding and permits a multiple choice of joint at every connection.

Since aluminum is about one-third the weight of other commonly used metals, its use reduces cost and weight of the supporting structure as well as providing corrosion resistance.

Aluminum is non-sparking, and, in addition to corrosion-resistance properties, aluminum pipe has a low friction factor.

Joints may be butt-welded or socket-welded with aligning connectors. Either serrated flanges or unions may be used where demountable joints are required.

Serrations on the ID of both the union ferrule and the flange allow either pipe or fitting to be expanded directly into the union or flange insuring a tight joint without welding.

Other fittings includes tees, crosses, 45° and 90° elbows, caps, eccentric and concentric reducers, and stub ends.

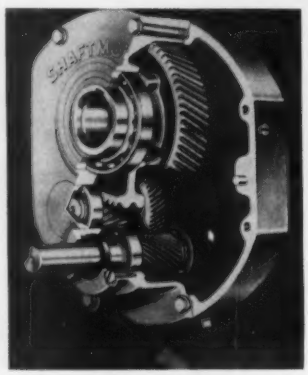
(Aluminum fittings are manufactured by Horace T. Potts Company, Speedline Division, Dept. P&PSE, Erie Avenue and "D" St., Philadelphia 34, Pa.)
Circle 9040 inside back cover.

Speed reducer mounts directly on shaft

For direct mounting on the driven shaft, speed reducer comes in a range of sizes from ¼ to 40 hp and in speeds from 125 to 5 rpm. Two ratios are available — 15:1 and 24:1.

A wide choice of mounting positions makes the unit adaptable in applications where limited space might present problems. The tie rod attaches to the front for convenience and may be provided with an automatic overload release.

Having a cast iron case, the reducer features hardened, precision-finished gears. The oil seal cap has been designed for quick, convenient replacement without a disassembly unit — a screw-driver being the only tool required.



Units are offered in a range of sizes from ¼ to 40 hp

Where the application requires reverse protection, a positive non-reverse backstop is available. Its location on the front side of the unit permits installation without dismounting the unit from the shaft. The backstop is easily removed and reversed when gear rotation in opposite direction is desired.

(Shaftmount Syncrogear is manufactured by U. S. Electrical Motors Inc., Dept. P&PSE, Box 2058 Terminal Annex, Los Angeles 54, Calif.)
Circle 9041 inside back cover.

Portable lamp for explosive atmospheres

Designed originally for maintenance and inspection work in potentially explosive areas of the aircraft industry, portable lamp handles as easily as a flashlight.

Featuring high-intensity illumination, the lamp uses a 65,000 candlepower aircraft landing light. It provides shadow-free spots of approximately 2500 foot-candles at

Lamp uses powerful aircraft landing light

three feet and 1500 foot-candles at five feet. Minimum lamp life is 100 hours.

The unit — including 36-foot cord and transformer — is completely sealed in heavy, vulcanized neoprene rubber. This provides reliable performance in any weather condition and safeguards against sparks and shorts when used in explosive situations.

("Jetlite" is product of Burton Manufacturing Company, Dept. P&PSE, 2520 Colorado Ave., Santa Monica, Calif.)
Circle 9042 inside back cover.

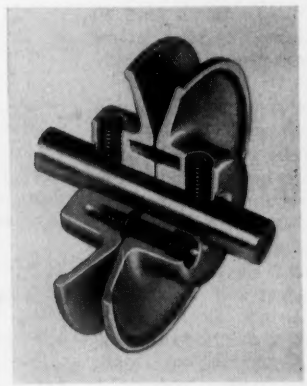
You can adjust pitch with micrometer setting on V-belt pulley

A 3¼" diameter variable pitch V-belt pulley has micrometer adjustment to set pitch to desired rpm required on driven pulley. It can be used with ⅜", ½" and ⅝" top width V-belts.

Each half of the pulley is directly fastened to the motor shaft which eliminates any parallel or angular misalignment between halves.

The adjustment is made by turning a socket cap screw on the end of the hub after loosening one half of the variable from the shaft. The adjusting half moves parallel with the shaft, and once a setting is reached, the fastening set-screw is tightened, thereby again securing the variable half to the shaft.

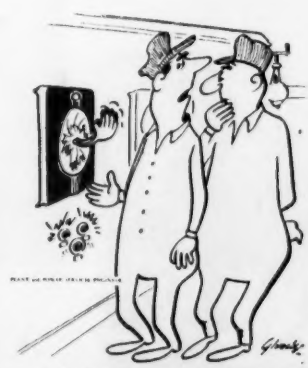
This method of adjustment is more positive. The variable is truer running and always in perfect balance regardless of the opening between halves.



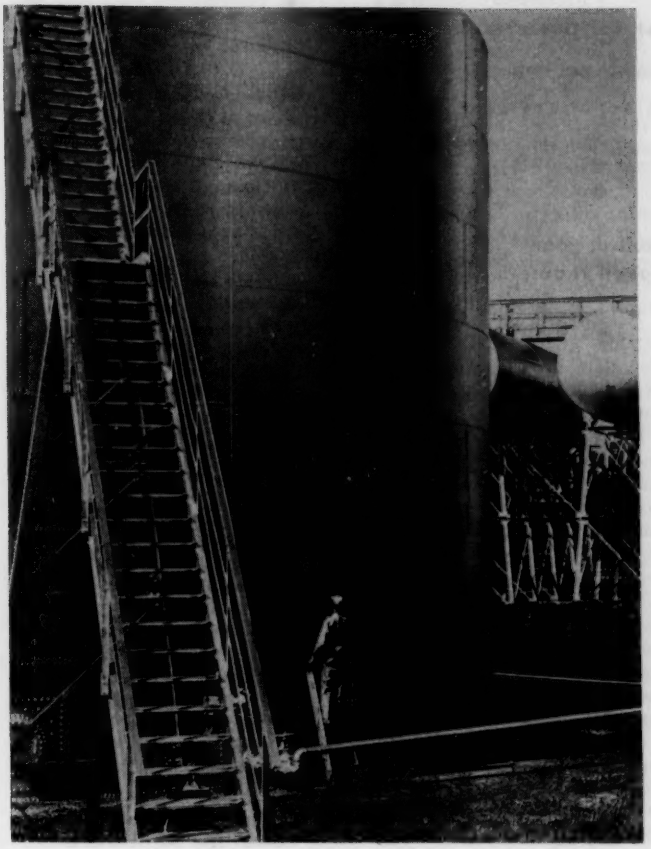
Design eliminates parallel or angular misalignment

Maximum side wobble of groove is 0.005" (total indicator reading). The pulley is available in ½" to ⅝" bore sizes.

(Variable Pitch V-belt pulley is product of Congress Drives Division, Tann Corporation, Dept. P&PSE, 3750 East Outer Drive, Detroit 34, Michigan.)
Circle 9043 inside back cover.



"I do believe it's trying to tell us something!"



Stainless steel paint has very good brushing and covering properties

Paint on stainless steel to protect iron surfaces

Designed to be used on exposed steel and aged galvanized iron, a multi-pigment stainless-steel paint will reduce maintenance costs considerably.

Developed in cooperation with a large power company, the paint contains mixtures of stainless-steel flakes (18% Cr, 8% Ni) and non-metallic pigments in an oil alkyd vehicle. It has successfully passed eight years of extensive laboratory and field tests for corrosion-resistant ability.

Durable in these corrosive atmospheres, the paint has a life expectancy of at least 12 years. Its very smooth surface sheds dirt to retain freshness after years of exposure.

Other features include: good brushing, hiding and package-stability properties, and minimum chalking.

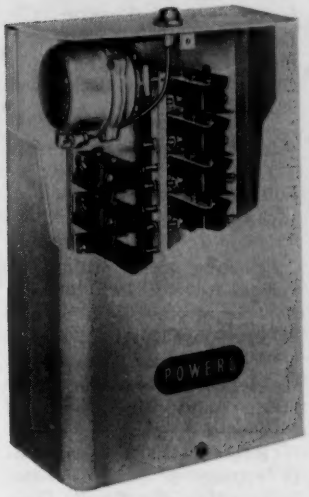
(No. 13448 stainless-steel paint is product of Vita-Var Corporation, Dept. P&PSE, 10 Commerce Court, Newark 2, N.J.)

Circle 9044 inside back cover.

Controls electrically from air signal

Providing step control of electric-heat unit ventilators, fan systems, pumps and refrigeration equipment, pressure-electric switch consists of a pneumatic motor which actuates a series of electric switches in response to a pneumatic signal.

The switch can be used to provide sequence operation of electrical equipment. For example, on unit ventilators having electric-resistance heating elements, it can be adapted so that each element is energized in sequence in response to changing air signals passed by a pneumatic thermostat. The result is smooth, gradual control of heat output.



Switch can be used to provide sequence operation of electrical equipment

Normal supply pressure of the device is 15 psi; maximum is 25 psi. Air connections are ⅛" NPT.

Switches are rated at 20 amps at 125, 250 and 460v AC, 1 hp at 115v AC, and 2 hp at 230v AC.

Maximum ambient temperature is 160°F. Dimensions are 8" wide, 12" high, and 4" deep.

(MS Switch is product of The Powers Regulator Company, Dept. P&PSE, 3434 Oakton St., Skokie, Ill.)

Circle 9045 inside back cover.

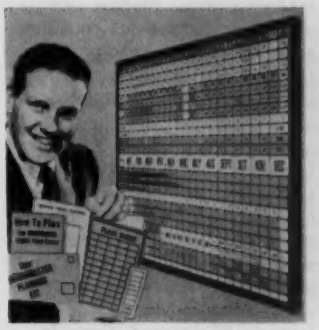
Simplifies scheduling maintenance, inventory

Can be attached to wall, or used on desk

Containing material for planning a graphic visual control, a planning kit gives many suggestions for picturing facts graphically in scheduling inventory, maintenance and other jobs.

A collection of 25 tested ideas for tailoring a system to individual requirements is included. Each idea is illustrated with suggested applications.

Also included is a 24-page booklet wich serves as manual and catalog. Over 100 illustrations are used to help explain the system and to picture some typical uses.



Kit tells how to set up schedules on master board

A plan sheet is furnished for plotting a system on paper. The 17" by 22" sheet is a reduced diagram with column alignment of a standard visual control panel.

The panel itself is made of aluminum and may be hung on the wall, propped on a desk or anchored on a swinging panel wall bracket with other units. Standard boards are 38 ½" wide by 24" high and weigh 9 lb.

Information is written or typed on cards which are posted by anchoring their four corners on the metal board. They snap in and flip out with finger-tip control.

(Planning Kit for Boardmaster system is product of Graphic Systems, Dept. P&PSE, 55 West 42nd St., New York 36, N.Y.)

Circle 9046 inside back cover.

NEW LITERATURE

for effective plant and power services operation

Reviews of books and industrial bulletins describing equipment, supplies, services

Electric generating plant catalog

Over 45 basic models of gasoline and Diesel engine-driven generator sets are listed in 2-color folder.

Each series of plants is described in detail, with specifications for both engine and generator given. A chart of representative models within each specific series outlines such details as capacity of the plant, model number, voltage, starting method, dimensions and weight.

Ranging up to 170,000 watts (gasoline) and 230,000 watts (Diesel), these plants are recommended for standby service in hospitals and industries where essential electrical requirements are substantial.

(Catalog F-146 is available from D. W. Onan & Sons, Inc., Dept. P&PSE, 2515 University Avenue, S.E., Minneapolis 14, Minnesota.)
Circle 9047 inside back cover.

Control transformer bulletin

Control transformer bulletin features quick reference chart that shows percent of rated load and percent of secondary voltage drop for control transformers used for intermittent or duty-cycle applications.

Total of 420 calculations is listed including duty cycles in one-minute intervals both "off" and "on" up to 15 minutes for each time cycle.

Detailed information covers construction of three designs, open core construction with leads, end-bell-enclosed types, and enclosed types for direct conduit connections.

(Bulletin 14-BL01 is issued by Acme Electric Corp., Dept. P&PSE, Cuba, New York.)
Circle 9048 inside back cover.

Electrical contacts

Materials, properties, forms and uses of electrical contacts are described in 4-page condensed catalog.

Discussed in the folder are contacts manufactured from fine silver, coin silver, palladium, gold, platinum and many powdered metal compositions.

(Catalog 601 is available from Gibson Electric Co., Dept. P&PSE, Box 691, Delmont, Pennsylvania.)
Circle 9049 inside back cover.

Tube fittings finder

Selecting proper fittings for various service and installation requirements is subject of four-page bulletin.

Includes shape charts for six types of industrial tube fittings and illustrations of tube-working tools.

(Bulletin 4306B1 from Parker Fittings & Hose Division, Parker-Hannifin Corp., Dept. P&PSE, 17325 Euclid Avenue, Cleveland 12, Ohio.)
Circle 9050 inside back cover.

Fully explains heavy-duty air compressor

A stationary air compressor built for continuous, heavy duty service for pressures to 125 psi with piston displacements from 468 to 974 cfm is described in 24-page bulletin.

Specifications, diagrams, cross section drawings, installation photographs and other pertinent information are given.

(Bulletin A-62 is issued by Joy Manufacturing Co., Dept. P&PSE, Oliver Bldg., Pittsburgh 22, Pa.)
Circle 9051 inside back cover.

Helical gear speed reducers

Helical-gear speed-reducers catalog gives detailed selection data on 20 reducer sizes in double, triple and quadruple reductions.

Horsepower and torque ratings, dimensions, overhung load for high and low speed shafts, and mounting arrangements are given along with a resume of construction features.

The 20-page publication also contains selection information on motor couplings and geared flexible couplings for the helical gear speed reducers.

(Book 2751 is issued by Link-Belt Company, Dept. P&PSE, Prudential Plaza, Chicago 1, Ill.)
Circle 9052 inside back cover.

Level transmitters

Four-page specification sheet carries information on pneumatic force-balance transmitters for measurement of level over range spans of 1 inch H_2O to 2000 inch H_2O.

(Specification P31-1 is available from Bailey Meter Co., Dept. P&PSE, 1050 Ivanhoe Road, Cleveland 10, Ohio.)
Circle 9053 inside back cover.

Pre-engineered belt conveyor

Pre-engineered sectional belt conveyor is featured in bulletin. Technical data, pre-engineering advantages and an exploded view of the belt conveyor are included.

(Bulletin 458 is available from Stephens-Adamson Mfg. Co., Dept. P&PSE, Ridgeway Avenue, Aurora, Ill.)
Circle 9054 inside back cover.

Spectrometer leak detector

High accuracy detector locates leaks in vacuum and pressure systems. Twelve-page bulletin features operating principles, installation and consultation services.

(Bulletin GEZ-2939 is issued by General Electric Corp., Dept. P&PSE, Schenectady 5, New York.)
Circle 9055 inside back cover.

Boiler water gages and valves

Gages for wsp up to 3000 psi feature a different concept in high pressure gage design.

Principles of light refraction are employed. Water level shows black similar to reflex gages; the steam area shows clearly as a line of brilliantly lighted bull's-eyes.

Chambers and covers are machined from carbon steel and are said to be rustproof; glasses are of high-grade borosilicate, heat treated and tempered.

(Data Unit No. 358 is issued by Jerguson Gage & Valve Co., Dept. P&PSE, 80 Adams Street, Burlington, Mass.)
Circle 9056 inside back cover.

Liquid seals out water — prevents corrosion

A liquid that prevents moisture damage and corrosion on electrical and electronic equipment is subject of 6-page bulletin.

Called CRC 2-26, the liquid corrosion inhibitor is said to extend operational life, eliminating costly downtime and reducing repair costs.

Folder includes explanation on how the liquid works, its benefits, advantages and applications, factual case histories and details on its physical specifications.

(CRC 2-26 folder is available from Corrosion Reaction Consultants, Inc., Dept. P&PSE, 116 Chestnut Street, Philadelphia 6, Pa.)
Circle 9057 inside back cover.

Plastic pipe technology — 16 pages of facts

Types of plastics used in piping systems are discussed in 16-page engineering catalog.

Other data given include: methods of coupling pipe to plastic valves, plastic pipe standards, installation practices, working pressures and temperatures for plastic valves, and corrosion effects of 280 chemicals on five different plastics.

Booklet also contains chemical resistance and physical properties charts.

(Catalog No. 159 is available from Chemtrol, Dept. P&PSE, 10872 Stanford, Lynwood, California.)
Circle 9058 inside back cover.

Socket screws — all kinds shown

Eight-page bulletin describes complete line of standard socket screw products.

The literature covers socket-head cap screws, set screws, button heads, flat heads, shoulder screws and socket screw keys, as well as precision dowel pins, pressure plugs and square-head set screws.

(Form 2338 is issued by Standard Pressed Steel Co., Industrial Fastener Division, Dept. P&PSE, Box 341, Jenkintown, Pa.)
Circle 9059 inside back cover.

The things vacuum equipment can do

Four-page folder describes how vacuum equipment is used to reclaim, process and convey scores of materials.

It tells about such applications as pneumatic conveying, cleaning boiler tubes, and removing used coolant from machine pumps. Both standard and special models are discussed and illustrated.

("Invincible Vacuum Equipment" folder is available from Invincible Vacuum Cleaner Mfg. Co., Dept. P&PSE, Dover, Ohio.)
Circle 9060 inside back cover.

Variable transmission has constant hp output

Two-page catalog includes engineering data and complete specifications on a variable speed transmission with ratios 3:1 to 9:1 and basically constant horsepower output.

The design is built around a patented belt which is a timing belt on the outside and a V-belt on the inside.

(19000 Transmission bulletin is issued by Western Manufacturing Company, Dept. P&PSE, 3400 Scotten Ave., Detroit 10, Mich.)
Circle 9061 inside back cover.

Power supplies in full range

Complete range of AC and DC power supplies is described in four-page bulletin. Supplies are designed to regulate voltage, current, or power for industrial processes.

Systems are designed to handle input to 15kv, single-phase or three-phase, 25-60 cycle. Output ratings are to 100,000 amps, single-, two- or three-phase or direct current.

(Bulletin 1000 is issued by Hevi-Duty Electric Co., Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9062 inside back cover.

Thermocouple catalog

Thermocouples and thermocouple components and accessories are described in 52-page catalog.

Standard assemblies in protecting tubes and wells for general applications; specialized thermocouples and assemblies for laboratory and industrial applications; and an extensive line of bare and insulated thermocouple wires, replacement elements, ceramic insulators, metal and ceramic protecting tubes, wells, terminal heads and extension leadwires are covered.

(Catalog EN-S2 is issued by Leeds & Northrup Co., Dept. P&PSE, 4934 Stenton Avenue, Philadelphia 44, Pa.)
Circle 9063 inside back cover.

Shows self-cleaning pipeline strainer

Self-cleaning pipeline strainers, installed in the pipeline ahead of the equipment, protect the working parts of temperature and pressure regulators, steam traps, pumps, meters, burners, compressed air equipment, hydraulic systems, lubricators and nozzles.

Features of the strainer illustrated in 2-page bulletin include high strength construction of the bronze bodies, long tapered screen socket, and built sediment collection chamber integral with cap.

(Bulletin 1210-1 is available from Sarco Company, Dept. P&PSE, 635 Madison Avenue, New York, N. Y.)
Circle 9064 inside back cover.

Relays, thermostats and thermoregulators

Mercury-in-glass fixed contact thermostats, adjustable thermoregulators and magnetic relays for laboratory, industrial, marine and agricultural applications are subject of two-page bulletin.

Fully illustrated, the catalog shows many different models.

(Bulletin T-5 is issued by Precision Thermometer & Instrument Co., Dept. P&PSE, 1434 Brandywine Street, Philadelphia 30, Pa.)
Circle 9065 inside back cover.

Process alarm system is fail-safe

Unique fail-safe annunciator wnich differentiates immediately between its own component failure and an alarm in the systems being protected is illustrated and described in four-page bulletin.

Design utilizes two lamps per annunciator point, one to signal field abnormality and one to signal annunciator component failure.

(Bulletin 108 is issued by Panellit, Inc., Dept. P&PSE, 7401 N. Hamlin Avenue, Skokie, Ill.)
Circle 9066 inside back cover.

Pumps for underground or surface discharge

Complete and detailed information on propeller and mixed-flow pumps for above- or below-ground discharge is contained in six-page bulletin.

Cut-away drawings, installation sketches and measurements, delivery and performance tables are presented in addition to information on all uses and applications.

(Bulletin No. 350 is available from Layne & Bowler, Inc., Dept. P&PSE, Memphis 8, Tennessee.)
Circle 9067 inside back cover.

Small basic switches

Four main groups of small basic switches along with auxiliary actuators and assemblies for each group are described and illustrated in 20-page catalog.

Type "V3" postage-stamp-sized switches for high capacity and long life; type "TB" 2-circuit switches for compact control of two or four isolated circuits; type ISXI sub-subminiature switch; and type "SM" subminiature switches are the groups described.

Catalog contains details on almost 100 switches, actuators and assemblies.

(Catalog 63 is available from Micro Switch, Division of Minneapolis-Honeywell Regulator Co., Dept. P&PSE, Freeport, Ill.)
Circle 9068 inside back cover.

Two-pass boiler

Bulletin describes 2-pass unit for heating and power, featuring wet-back construction, safe updraft gas passages, ease of maintenance, large furnace volume and high thermal efficiency.

Bulletin includes design details, specifications and range of sizes in the series.

(Bulletin B-3232 may be obtained from Titusville Iron Works, Dept. P&PSE, Titusville, Pennsylvania.)
Circle 9069 inside back cover.

Meter-relay shows signal level

New type of meter-relay shows the signal level even while control circuits are energized.

Four-page bulletin shows circuit stages involved in operation of the new design. The device uses booster coils to insure reliable control action. Instantaneous reset simplifies circuitry and eliminates a number of associated components formerly necessary.

("The Picture Story of the CRMR," Bulletin S-2 is issued by Assembly Products, Inc., Chesterland, Ohio.)
Circle 9070 inside back cover.

Describes "tailor-made" gas sampling systems

Because no single gas sampling system can handle all gas analysis applications, a packaged method of sampling system selection has been developed.

Complete information on the systems is contained in eight-page bulletin that gives a step-by-step procedure for selecting the components of a specific sampling system and lists typical systems for specific applications.

(Publication 59-B651 is issued by The Hays Corporation, Dept. P&PSE, Michigan City, Ind.)
Circle 9071 inside back cover.

Explains electronic liquid level control

Fully transistorized, electronic amplifier relay for liquid level control is subject of four-page illustrated folder.

The device is described as giving low cost, high precision level control for any electrically conductive liquid with a resistance below 25,000 ohms.

(Specification S1017-1 is issued by Minneapolis-Honeywell Regulator Company, Industrial Division, Dept. P&PSE, Wayne and Windrim Avenues, Philadelphia 44, Pa.)
Circle 9072 inside back cover.

Mercury vapor lamps that are safe

Line of mercury vapor lamps for areas where explosion-proof equipment is a "must" is subject of eight-page bulletin.

In addition, the fixture provides 2½ times as much light as normal. They are available with 250-watt lamps of clear or color-corrected type and with 400-watt lamps either clear, color-corrected or silver-white.

A wide choice of mountings, reflectors, globes and guards are available.

(Bulletin 303 is issued by Appleton Electric Company, Dept. P&PSE, 1701 Wellington Ave., Chicago 13, Ill.)
Circle 9073 inside back cover.

How to break in equipment

Using drawings, photographs, type and color, four-page bulletin tells what occurs internally in motors and machinery being "broken in" and cites 10 reasons why colloidal graphite and molybdenum disulfide lubricants are superior in such operations.

(Bulletin 421 is issued by Acheson Colloids Company, Dept. P&PSE, Port Huron, Mich.)
Circle 9074 inside back cover.

Centralize power distribution

Six-page brochure covers complete line of shallow-depth switchboards through 2000 amps which are designed to aid industrial and contractor engineers in centralizing their power distribution.

The bulletin shows how only eight basic sections can be combined to meet hundreds of individual switchboard applications.

(Bulletin 2015 is issued by Federal Pacific Electric Company, Dept. P&PSE, 50 Paris St., Newark 1, N.J.)
Circle 9075 inside back cover.

Groups relamping program

Group relamping plan booklet describes how money and time can be saved to users of large quantities of fluorescent lamps. Sample calculations help the user calculate his own relamping schedule.

(Booklet A-6832 is issued by Westinghouse Lamp Division, Dept. P&PSE, Box 388, Bloomfield, N.J.)
Circle 9076 inside back cover.

Fault current data report

Overload and fault current limitations of bare aluminum conductors are discussed in graphically illustrated report.

Graphs show maximum allowable time for various high value emergency or short circuit currents in transmission or distribution lines.

The report gives necessary data to determine fuse selection, or circuit breaker or relay settings, for various conductor sizes and applications.

(Section 7 "Overload and Fault Current Limitations of Bare Aluminum Conductors" is issued by Alcoa Sales Office, Dept. P&PSE, 1501 Alcoa Bldg., Pittsburgh 19, Pa.)
Circle 9077 inside back cover.

All about window corrosion control

Corrosion of plant window facilities — and how to combat it — is subject of public service brochure.

The publication contains new information about an alloy bonding of zinc to steel that assures protection against corrosion without the necessity of painting.

The galvanizing protection is self-healing. Pin holes and scratches in the surface are automatically filled by the sacrificial action of the heavy zinc coating.

(Brochure AR-1 is issued by Fenestra, Inc., Dept. P&PSE, 2250 East Grand Blvd., Detroit 11, Mich.)
Circle 9078 inside back cover.

Adjustable-speed drives

Performance and application data on adjustable speed drives from ⅛ through 4 horsepower is covered in twelve-page, two-color booklet.

Illustrated with photos and cartoon drawings, the booklet gives condensed specifications, dimensions, and includes a gearmotor selection table.

(Bulletin D-2507 is issued by Reliance Electric and Engineering Co., Dept. P&PSE, 24701 Euclid Avenue, Cleveland 17, Ohio.)
Circle 9079 inside back cover.

For treatment of wastes

For users of horizontal flow gravity separation equipment, 4-page bulletin describes clarifiers and thickeners, water and liquid treatment units.

Design features such as submerged orifice plate water collection system, heavy-duty box-truss scrapers, protectatrol overload recorder and hydraulic lifter for sludge scrapers are included.

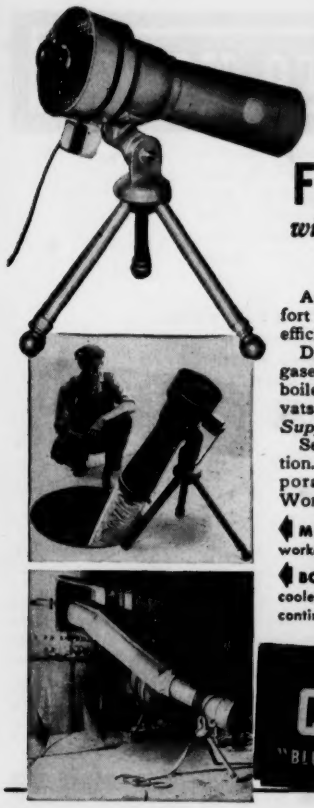
(Bulletin WC-123 is issued by Graver Water Conditioning Co., Dept. P&PSE, 216 West 14th Street, New York 11, N. Y.)
Circle 9080 inside back cover.

Data processing equipment

Profusely illustrated bulletin describes data processing equipment in use, including digital data processing and analog and digital computing systems.

Types of inputs, input switching, output devices and modes of operation for applications in electric power, petrochemical, aeronautics, agriculture and other fields.

(Technical Publication N-07 (1) is issued by Leeds & Northrup Co., Dept. P&PSE, 4934 Stenton Avenue, Philadelphia 44, Pa.)
Circle 9081 inside back cover.



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Circle 9082 inside back cover.

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Data Editor
PLANT and POWER SERVICES ENGINEER
111 E. Delaware Place
Chicago 11, Illinois

CUT HERE AND FILE

Plant-Power Services Engineer **nomograph** **44**

Estimating cork insulation thickness to prevent condensation

Data by
MUNDET CORK CORPORATION
Nomograph by
PUTMAN PUBLISHING STAFF

Where plant processes create a high relative humidity, plant walls and ceilings often "sweat" in cold weather. In order to prevent such condensation without dehumidifying, it is necessary to cut heat loss through the walls and roofs involved.

This nomograph is designed to show how much cork insulation is required, under specific conditions, to eliminate condensation. It considers moisture content of the air, temperature difference and thermal conductivity of walls and ceilings.

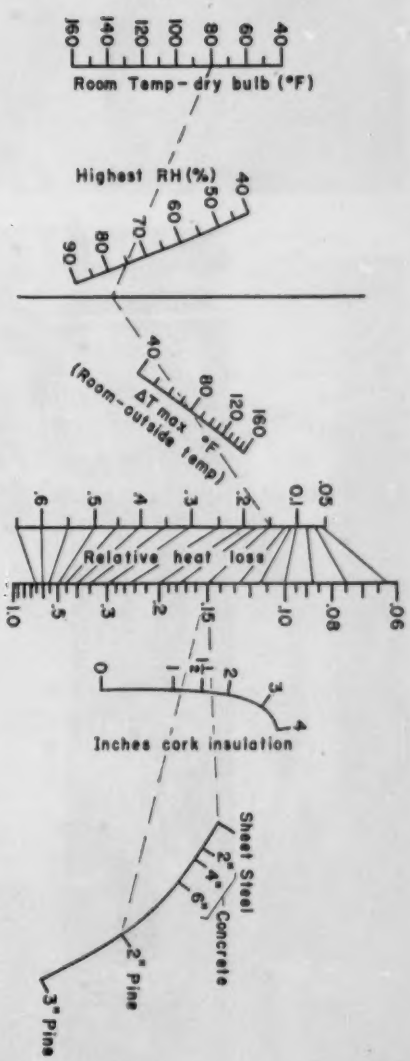
Typical Example

In one plant operation with room temperature of about 80°F, relative humidity rises to 75%. Lowest outdoor winter temperature is 0°F. Plant roof is 2" pine, some sections of the wall are sheet steel, and others 6" concrete. How much cork insulation is required to prevent condensation?

Align room temperature with relative humidity to point on reference line. Align this point with maximum temperature difference (80−0) or 80° F.

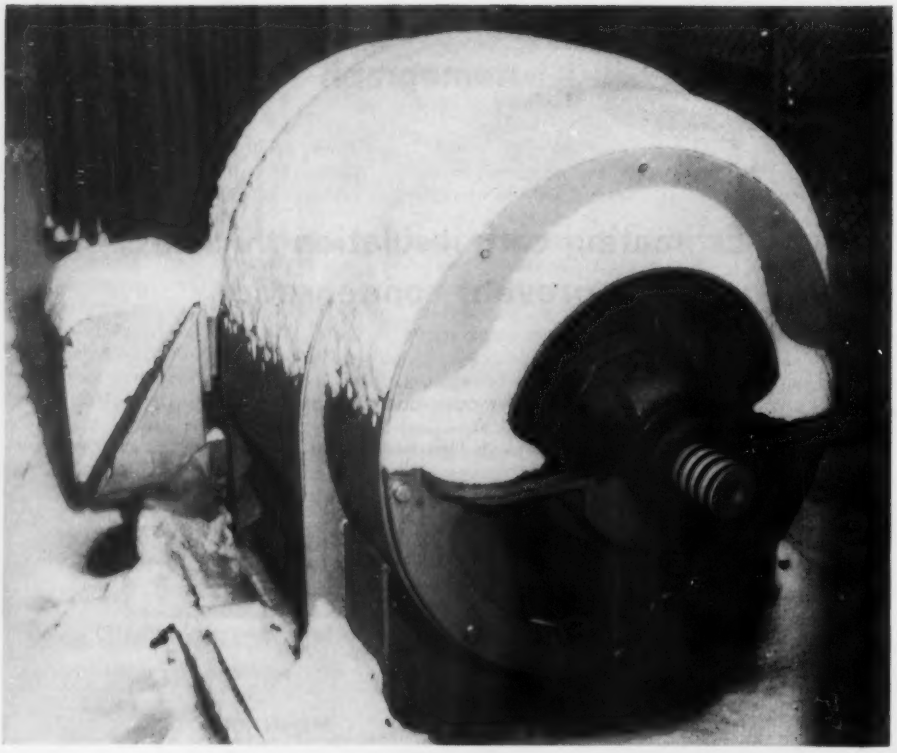
This produces relative heat loss figure of 0.15 on the left side of heat loss scale. Follow the guideline through the modulus to the ring side of the scale to 0.15. Align this point with the wall or roof description at right.

It will be seen that the pine roof and 6" concrete walls can be adequately insulated with 1½ inches of cork. Sheet steel sections call for more than this — probably 1¾" or 2" of cork.



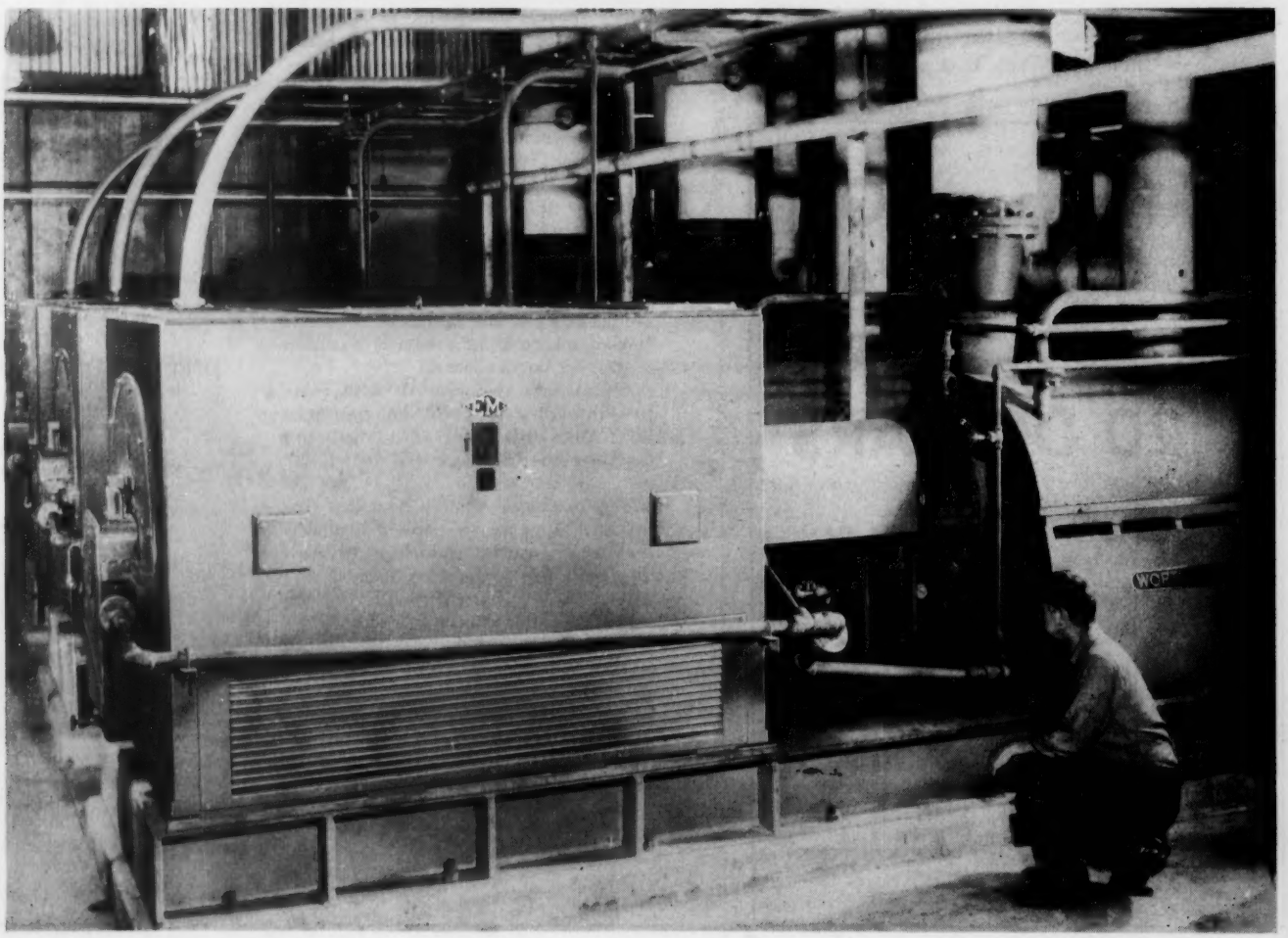
January, 1960

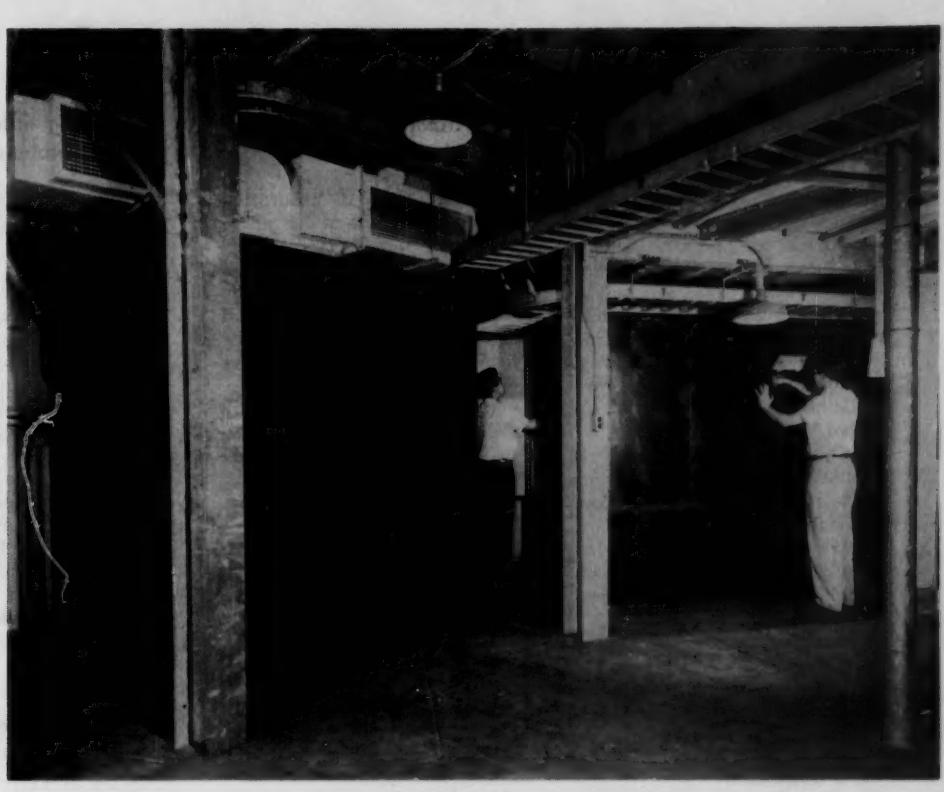
PHOTO NEWS



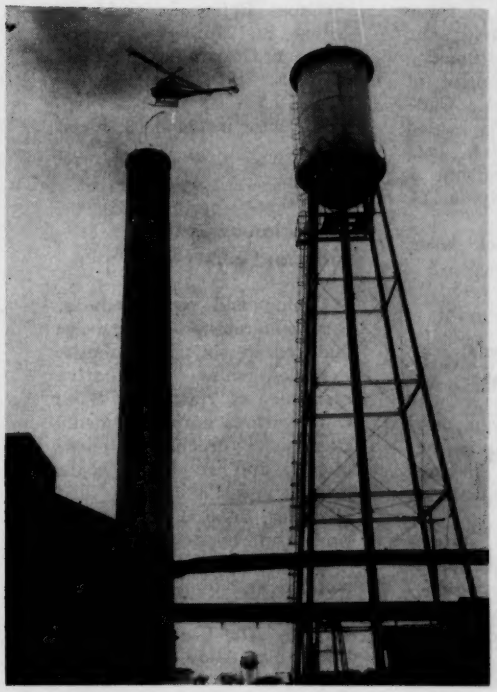
INDOOR MOTOR OUTDOORS has been successfully tested by Westinghouse engineers. Insulation advances have enabled the 500-hp induction motor to be operated through two complete winters. So far, no difficulty has been encountered, and Westinghouse plans to continue to operate the motor for an indefinite time.

COMPACT DESIGN allows close, side-by-side installation and low silhouette with these 2500-hp motors driving boiler feed pumps at Plant #6 of Northern States Power Company, High Bridge Station, St. Paul, Minn. The motors developed by Electric Machinery Mfg. Co. of Minneapolis also feature quiet operation and straight-up ventilation.

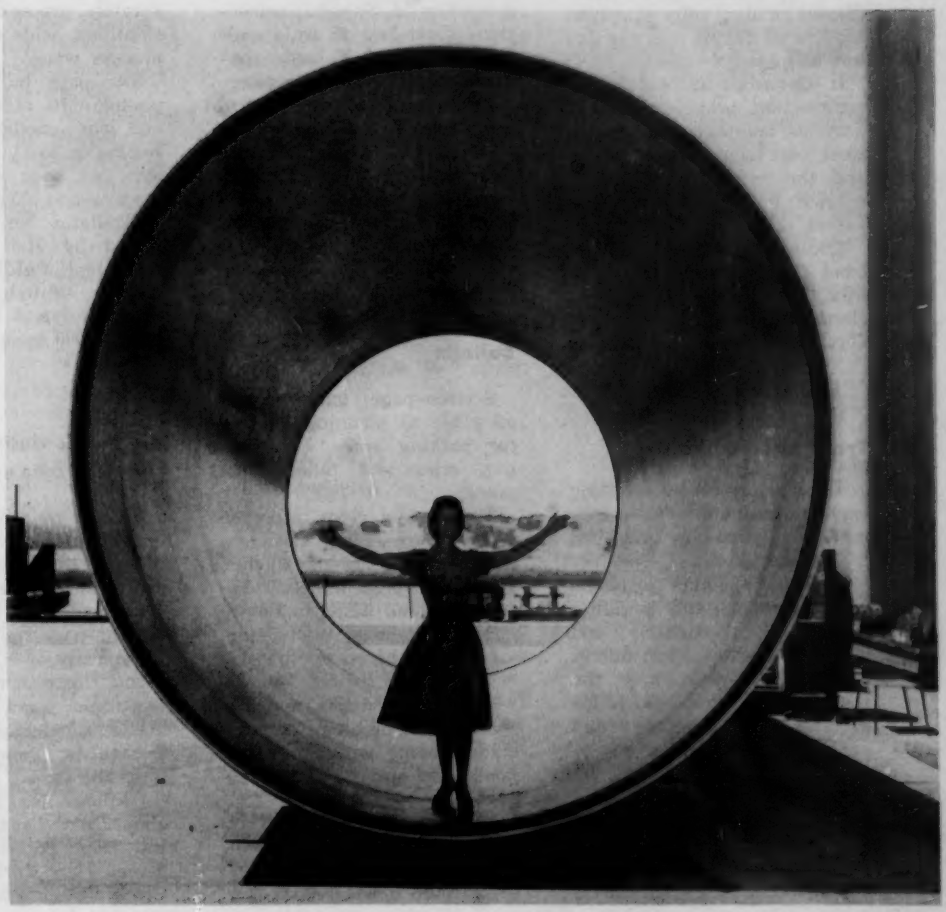




PACKAGED REFRIGERATION units were developed by Carrier Corporation to remove heat from closely integrated banks of electronic tubes and tiny electrical switches in radar towers. The 15-ton air-cooled units work equally as well in the tropics as in salt water or artic regions.



TALL PROBLEM was successfully handled by a Hiller Aircraft helicopter when a steel band at top of chimney snapped into three pieces. Two of the pieces fell to the ground, but the third hung perilously on the rim of the 170-ft power plant chimney, belonging to Charmin Paper Products Co., Green Bay, Wis. Since there was no other quick way to reach the top, a helicopter was pressed into service. The pilot lassoed the 75-lb piece and brought it down in 10 minutes, allowing the plant to remain in full operation.



COAL-TAR ENAMEL COATING was centrifugally applied to the inside of this section of 13-ft pipe. The pipe, when installed, will carry 50 million gallons of water per hour into the turbines of Southern California Edison's new Mammoth Pool station. The centrifugal casting method applied the Koppers Co. coating on a 30-ft section of pipe in just 2½ minutes.

Compressed air fundamentals

Designed to help anyone in the selection of a small packaged air compressor, 16-page booklet also basically describes compressed air, how it is compressed, single- and two-stage compressors, piston displacement, actual delivery, unloading of compressors, regulation and types of controls used.

Other material included is information on compressor oils, pipe sizes, wire sizes and terminology.

(Form 1548 is issued by Ingersoll-Rand Company, Dept. P&PSE, 11 Broadway, New York 4, New York.)
Circle 9083 inside back cover.

Ductile iron regulators are available

Four-page bulletin is a condensed catalog, fully illustrating line of ductile iron regulators and control valves.

It describes in detail the composition, properties, specifications, comparison tables on steel, cast iron, and red brass, and the results of a severe quench test on ductile iron valves.

(Bulletin J-DI is available from OPW-Jordan, Dept. P& PSE, 6013 Wiehe Road, Cincinnati 13, Ohio.)
Circle 9084 inside back cover.

Transducer bulletin

Transducer for connecting control computers to pneumatic equipment is described in 2-page bulletin.

Bulletin explains principle of operation, and outlines transducer's pneumatic and electrical rating specifications, performance data, and the special features of design for preliminary computing and control system studies.

(Bulletin E-106 is issued by Associated Control Equipment, Inc., Dept. P&PSE, 853 Fourth Avenue, Coraopolis, Pa.)
Circle 9085 inside back cover.

Acoustical treatment for industry

High sound absorption acoustical treatment for office buildings, hotels, stores, restaurants, schools and churches is subject of 4-page bulletin.

Technical data on sound absorption, fire hazard classification, and light reflectivity is also included.

(Bulletin S-10 is issued by Columbia Acoustics and Fireproofing Co., Dept. P&PSE, Stanhope, N.J.)
Circle 9086 inside back cover.

Wall chart tells how to weld connections

Wall chart tells how to weld electrical connections to copper and steel without external power source.

General instructions explain how to select a mold, prepare the cable, and make a solid weld. Specific instructions show how to weld end-to-end, T, and X cable connections, as well as connections to ground rods, steel surfaces and bus bars.

(Chart is available from Burndy Corp., Dept. P&PSE, Norwalk, Conn.)
Circle 9087 inside back cover.

Area floodlighting bulletin

Sixteen-page bulletin acts as guide to planning lighting for parking areas, construction sites and other open areas.

The booklet gives reference guides for selecting incandescent or mercury floodlights, general purpose or heavy duty types, and helps to determine how many floodlights are needed based on the size of area to be lighted.

Footcandle charts and installation diagrams are included, along with listings of floodlights and mounting accessories.

(Bulletin 2719 is issued by Crouse-Hinds Co., Dept. P&PSE, Syracuse 1, N.Y.)
Circle 9088 inside back cover.

Controlling industrial water problems

"Control of Water Problems in Air Conditioning Systems," is the title and subject of 4-page bulletin.

Such problems as corrosion, scale formation and slime and algae growths are treated along with concrete suggestions for the control of these problems through adequate, planned chemical treatment.

(Bulletin 596, "Control of Water Problems in Air Conditioning Systems" is issued by Betz Laboratories, Inc., Dept. P&PSE, Gillingham & Worth Sts., Philadelphia 24, Pennsylvania.)
Circle 9089 inside back cover.

Proportions chemicals for water treatment

An electrically driven, positive-displacement pump accurately proportions chemical solutions, acids and alkalis to process water.

Two-page bulletin contains photographs of single, double and triple models for proportioning up to 11, 22 and 33 gallons per hour into discharge pressures to 125 psi.

(Bulletin No. 1210.20-1 is issued by B-I-F Industries, Inc., Dept. P&PSE, 345 Harris Avenue, Providence, Rhode Island.)
Circle 9090 inside back cover.

Ultrasonic cleaning for electronic equip

Process by which high frequency sound waves impart intense scrubbing action to solutions to speed precision cleaning is described in detail in four-page bulletin.

Typically, it is used on precision instruments bearings, electronic parts, gear trains, housings, electronic cylinder assemblies, gages, micrometers, fine tools.

(Bulletin No. 16A is available from Oakite Products, Inc., Dept. P&PSE, 157 Rector Street, New York 6, N.Y.)
Circle 9091 inside back cover.

Cross reference guide for ballast

Cross reference guide for ballasts has been issued. Available in either wall chart or loose-leaf binder, the guide contains a ballast rating table, and information regarding mounting dimensions, individual cartons, code dating, etc.

(Cross Reference Guide is issued by Universal Manufacturing Corp., Dept. P&PSE, 29-51 E. Sixth Street, Paterson, N.J.)
Circle 9092 inside back cover.

Corrosion-resistant tube and pipe

Tubing and pipe made of corrosion-resistant alloys are featured in six-page bulletin.

Tables show comparative resistance of Hastelloys Band C to various corrosive media such as hydrochloric, phosphoric, and sulphuric acids, nitric and oxidizing acid mixtures, organic acids, chlorine and hypochlorites and acid salts at specified concentrations and temperatures.

(Hastelloy Bulletin is issued by The Carpenter Steel Company, Alloy Tube Div., Dept. P&PSE, Union, N.J.)
Circle 9093 inside back cover.

Application manual for ventilator control

Complete line of automatic control systems for hot water, steam, gas-fired, and electric unit ventilators is described in detail in manual.

Actual control applications are shown on each page, covering all makes and models marketed by the major unit ventilator companies. Complete cycles of operation, damper sequence charts, specifications for precise temperature control and installation data are included for each.

(Unit Ventilator Control Application Manual is issued by Barber-Colman Company, Dept. P&PSE, 1300 Rock Street, Rockford, Illinois.)
Circle 9094 inside back cover.

Describes dual-element cartridge fuses

First section of twelve-page catalog covers dual-element cartridge fuses in general, describing their design, construction and operation.

Two types are covered in rest of catalog—the ferrule type from 0 through 60 amps (250 and 600v) and the knife-blade type from 70 through 600 amps (250 and 600v).

A full-page table shows what sizes are needed for specific motor protection applications.

(Bulletin 1330 is issued by Federal Pacific Electric Company, Dept. P&PSE, 50 Paris St., Newark 1, N. J.)
Circle 9095 inside back cover.

How to take care of Zeolite units

Data sheet gives technical discussion covering bacterial fouling, deposits and operational factors in relation to Zeolite softeners.

It tells, too, how exchange materials should be handled to maintain maximum efficiency and longer equipment life.

("The Care and Operation of Zeolite Softeners" is available from Betz Laboratories, Inc., Dept. P&PSE, Gillingham & Worth Streets, Philadelphia 24, Pa.)
Circle 9096 inside back cover.

Vinyl spray seals out rust and corrosion

Vinyl spray in aerosol "spray-on" containers for sealing out rust and corrosion on metal surfaces is subject of folder.

The coating sprays on quickly and is effective for touch-up work in inaccessible areas which cannot be easily reached with a paint brush.

(Copies of the folder can be obtained from National Electric Division, H. K. Porter, Inc., Dept. P&PSE, Porter Bldg., Pittsburgh 19, Pa.)
Circle 9097 inside back cover.

Low cost insulators

Engineering dimensions, physical and electrical properties and prices for insulators are given in 4-page catalog.

Molded from fiber glass reinforced polyester, the line is for voltages from 600 to 5000 volts. Heights range from 1⅜" through 3½". Advantages include high impact strength, dimensional accuracy and flame retardance.

(Glastic Insulator Catalog is issued by Glastic Corp., Dept. P&PSE, 4321 Glenridge Road, Cleveland 21, Ohio.)
Circle 9098 inside back cover.

Compressor bulletin

Four-color bulletin illustrates unit-type compressors including single-stage and two-stage compressors ranging in size from ½ to 15 hp.

Available pressures are from 80 to 250 psi.

A section of the bulletin is devoted to air receiver and auxiliary storage tank specifications and dimensions.

(Bulletin SG-2 is issued by Le Roi Division, Westinghouse Air Brake Co., Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9099 inside back cover.

Hydrostatic instruments in 88 pages

Pocket-size, 88-page handbook contains information on the principles of hydrostatic measurement, selection and installation of instruments, design and construction of panel systems, as well as useful engineering data and diagrams.

Some of the instruments described include: fuel oil indicators; indicators for small tanks, hydraulic machinery, reservoirs; liquid level controls; pneumatic manifold valves; and safety cleanout valves.

(Hydrostatic Instruments Handbook is available from Petrometer Corporation, Dept. P&PSE, 43-22 Tenth St., Long Island City 1, N. Y.)
Circle 9100 inside back cover.

Renewable fuse catalog

Renewable fuse catalog is illustrated with photographs, and cross sectional and cutaway drawings.

The catalog describes two types of renewable fuses — ferrule and knifeblade — as well as the renewal links for replacement.

Ratings from 3 to 600 amp are summarized in tables which include such data as fuse type, current, dimensions, and catalog numbers.

(Bulletin 1320 is available from Federal Pacific Electric Co., Dept. P&PSE, 50 Paris Street, Newark 1, N.J.)
Circle 9101 inside back cover.

For automatic control

For use with automatic combustion control systems or comparable industrial applications, a fully automatic sensing and transmitting instrument controls pressure or temperature by precise proportioning of process or combustion rate to load demand.

Twelve-page catalog contains specifications, description of components, application data, dimensions and wiring diagrams.

(Catalog CMC-687 is available from Cleveland Controls, Inc., Dept. P&PSE, 1111 Brookpark Rd., Cleveland 9, Ohio.)
Circle 9102 inside back cover.

Cooling tower drive bulletin

Speed reducers for cooling towers are designed and built especially for high speed heavy duty continuous service under conditions of heat and humidity.

Eight-page bulletin gives sizes, dimensions, horsepower ratings, and other helpful information.

(Bulletin No. 135-S is issued by The Cleveland Worm & Gear Company, Dept. P&PSE, 3300 East 80th Street, Cleveland 4, Ohio.)
Circle 9103 inside back cover.

Motion-control sheave bulletin

Variable-speed sheaves with resilient cam-follower are said to eliminate freezing and sticking. Eight-page bulletin contains cutaway photo and diagrams.

Tables facilitate the selection of companion sheaves and belts to meet specified drive requirements.

(Bulletin No. 8120 is issued by T. B. Wood's Sons Co., Dept. P&PSE, Chambersburg, Pennsylvania.)
Circle 9104 inside back cover.

Compressed-air dehydrator

Refrigerated compressed air dehydrator is subject of 4-page bulletin. The unit lowers the dew point of the compressed air to −10°F at 100 psig, thus removing vaporized and entrained moisture and oil from the compressed air. Atmospheric dew points of −30°F are obtainable with the unit.

Colored flow chart and illustrated drawings are included.

(Bulletin F-100 is available from Hankison Corp., Dept. P&PSE, College & Pike, Cannonsburg, Pa.)
Circle 9105 inside back cover.

Comprehensive manual on V-belt drives

Comprehensive 68-page manual on V-belt drives covers all phases of the selection, design, installation and maintenance of V-belt drives.

A method of "tempered" construction by an exclusive new process is said to increase belt horsepower rating by 40 per cent, and to minimize stretch, increase resistance to abrasion and shock, and add flexibility.

("Engineering Manual — Dickrope 'QD' V-Belt Drives" is issued by R. & J. Dick Company, Inc., Dept. P&PSE, Totowa, N.J.)
Circle 9106 inside back cover.

Back-pressure valves for oil service

Two series of back-pressure valves for use on tool lubrication machines, diesel engine lubrication, oil burner feeds and oil cooling units are described and illustrated in two-page bulletin.

One valve features a balanced piston design, while the other has an aspirating nozzle to produce higher capacities and closer control of system pressures.

(Bulletin No. 3-9 is issued by A. W. Cash Valve Mfg. Corp., Dept. P&PSE, PO Box 191, Decatur, Ill.)
Circle 9107 inside back cover.

Two-circuit switches

Two-circuit switches for use on machine tool limit and control mechanisms are described in data sheet.

Three switches have a combined stacking width of only 2.03 inches. A step-design, arc-resistant plastic case provides extra space between the integral terminals, reducing the possibility of shorting.

(Data Sheet 164 is issued by Micro Switch Division, Minneapolis-Honeywell Regulator Co., Dept. P&PSE, Freeport, Ill.)
Circle 9108 inside back cover.

Heat exchangers have finned tubes

Four-page bulletin describes line of finned-tube heat exchangers for heating, cooling or dehydrating air and other gases.

The bulletin illustrates the continuous, spiral-wound fins which are crimped to provide extra surface and to promote turbulence. The equipment can be used to remove excess heat from electrical generators and motors.

(Bulletin 11R is issued by Schutte and Koerting Company, Dept. HT-J, Cornwells Heights, Bucks County, Pa.)
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THAT'S INTERESTING

From inside front cover

Worthington Corporation, when a book he had helped author arrived from Red China.

As has happened with hundreds of works, Red China had pirated the book, a technical text entitled "Pump Questions and Answers." It had been published originally in the U.S. in 1949.

A friend travelling in the Far East happened upon the stolen Red Chinese version and bought a copy for the author. Until he received the book, Mr. Karassik had been unaware of its existence.

The book itself was a copy of the original edition, each page photo-copied and printed in English. There were only two small changes. One was on the title page, where the original publishers name had been replaced by the symbol of the Chinese.

Urbanites are wetter than suburbanites

The rain in Spain may fall mainly on the plain, but according to the Illinois State Water Survey Division, rainfall is heavier in an urban area than in sparsely settled districts nearby.

Increased turbulence from local heating, greater mechanical mixing of the air, and a greater concentration of condensation nuclei, in addition to increased water vapor from combustion processes may be the cause.

It is also conceivable that a rain gage in an urban area may collect more precipitation due to shielding from the surrounding buildings. That is, the shielding could reduce the wind and limit the turbulence in the vicinity of the gages, so that they collect a larger amount of precipitation than would be possible in an open exposure, where there is no obstruction to the wind field for several miles.

What good is specialized business publication advertising?

Frank Kistenberger
Metallizing Engineering Co., Inc.

Sells industry

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front . . . the men the ads are supposed to help . . . the men who sell.

Here is the statement of a salesman who knows what advertising does for him when it appears in the industrial, trade or professional publications that serve the specialized market to which he sells:

Says Mr. Kistenberger:

"I happen to know that better than 50% of my sales to new companies can be traced to leads from our business paper advertising. Another 25% of my sales to new owners I close after following up leads that can't be traced directly to our advertising, but I know darn well that that's where they come from because that's about the only place they could learn about our metallizing systems.

"It's been my experience that our trade advertising is getting to the right people. In many cases this man is an executive who is hard to see on a cold call. But he's a guy that will take the time and trouble to read and he's just the one to drum up interest in metallizing down the line in his company. In other words, you get more action if the suggestion comes down to the production department or the plant engineer from this executive. Of course, I don't mean to say that people will just read about a product like ours and instruct someone to write out an order. It's not that simple. But they do know about metallizing from our advertising and sometimes a surprising amount. That was particularly true of our new ceramic spraying equipment which was introduced last year and which got us into fields we'd never been in before. I think that getting a new product known is usually a pretty tough job but the leads our advertising got us were a big help in reaching the right people."

Why not ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives – and to make sure the publications that carry your advertising are read by the men who must be sold.

PLANT and POWER SERVICES ENGINEER

NBP

One of the 207 members of National Business Publications, Inc. ...each of which serves a specialized market in a specific industry, trade or profession.

Steam trap dependability is a matter of what the manufacturer puts into the trap

ARMSTRONG TRAPS ARE DESIGNED AND MADE TO GIVE YOU DEPENDABILITY

1. Efficient, proved operating principle

Armstrong Traps provide the most advanced development of the time-proven inverted bucket principle. Simple, but effective, there isn't much that can go wrong.

2. Good design

Armstrong Trap design gives big capacity in a small package. The mechanism is virtually fool-proof. All body styles are easy to inspect and maintain without removal from the line.

3. Highest quality materials of construction

Only the best goes into Armstrong Traps. Bodies are close grained 30,000 tensile iron castings or high quality forgings. Working parts are all tough, corrosion resistant stainless steel.

4. Good workmanship

Armstrong Traps are made by craftsmen who take pride in their work. Careful inspection and frequent checking insure the quality of the trap.

5. Application know-how

Your problem has probably been solved already in the extensive experience of the Armstrong engineering and sales organization. You can be sure of sound, dependable recommendations.

Your local Armstrong Representative can show you what Armstrong dependability can do for you. Call him today or write direct.

860 Series for low pressure heating service.

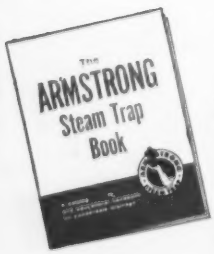
800 Series, side inlet, side outlet.

No. 801, side inlet, bottom outlet.

880 Series, integral strainer.

200 Series, bottom inlet, top outlet.

Forged Steel Series for high pressures, high temperatures.



The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

ARMSTRONG MACHINE WORKS

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